

ELEMENTS
— OF —
SURGERY
FOR
The Use of Students
WITH PLATES

BY
JOHN SYNG DORSEY, M.D.

PROFESSOR OF ANATOMY IN THE UNIVERSITY OF PENNSYLVANIA
ONE OF THE SURGEONS TO THE PENNSYLVANIA HOSPITAL
AND TO THE PHILADELPHIA ALMS HOUSE, &c.

IN TWO VOLUMES

SECOND EDITION WITH ADDITIONS.

VOL. II.

for want of timely care
Millions have died of medicable wounds.

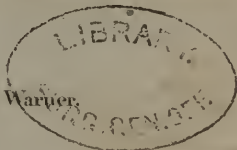
ARMSTRONG



PENNSYLVANIA HOSPITAL.

PHILADELPHIA

Published by E. & R. Parker & Benjamin Warner.





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**PUBLISHED BY EDWARD & RICHARD PARKER, No. 178, AND
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AINVEX

Surg, Clin.

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"one of the Surgeons to the Pennsylvania Hospital, and to the Philadel-
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D. CALDWELL,

Clerk of the District of Pennsylvania.

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ELEMENTS
OF
SURGERY.

CHAPTER I.

Of Scirrhus and Cancer.

A PAINFUL, incurable ulcer, results from the suppuration of certain indurated tumours. The tumours are denominated scirrhus ; the ulcer is called cancer. These definitions (if they deserve the name) are by no means satisfactory, but it is not easy to describe in a few words, those tumours which will certainly produce cancer, nor those ulcers which are decidedly cancerous, except in particular cases. The truth of this remark will not be doubted by any person who will take the trouble to consult the different surgical writings which contain histories of cancerous complaints. There is perhaps no subject on which accurate discrimination is of more importance, and none in which it is made with more difficulty.

Scirrhus and cancer occur in every part of the body, glandular parts are however much more liable to the disease than others.

A true scirrhus, before it degenerates into a cancerous sore, is hard and unequal on its surface, slightly sensible to the touch, not tending to suppuration, and en-

larging very slowly in its commencement; “but at length assuming a more active form, it is surrounded with superficial varicose veins, it becomes more painful, and changes the texture of the adjacent cellular membrane or cuticular covering, to which it frequently adheres: the skin will, in this advanced period, sometimes be discoloured, and puckered or retracted, especially in the female breast; perhaps attended with a degree of softness or fluctuation in some part of the tumour, with shooting pains in its neighbourhood; and at last breaking into a malignant sore, with fungous flesh, and retroverted edges; it is named an open cancer.”

The progress of the disease is not always equally rapid; in some cases a scirrhus tumour remains for many years indolent, and in other instances it ulcerates in a few weeks after it is first noticed.

It is always satisfactory to ascertain, if possible, the nature of a tumour after it is removed. The appearance of a scirrhus tumour has been very well described by Mr. Home. “When a section is made of such a tumour in an early stage, provided the structure can be seen to advantage, it puts on the following appearance: the centre is more compact, harder to the feel, and has a more uniform texture than the rest of the tumour; and is nearly of the consistence of cartilage. This middle part does not exceed the size of a silver penny: and from this, in every direction, like rays, are seen ligamentous bands of a white colour, and very narrow; looking, in the section like so many extremely irregular lines, passing to the circumference of the tumour, which is blended with the substance of the surrounding gland. In the interstices, between these bands, the substance is different and becomes less compact towards the outer edge. On a more minute examination, transverse ligamentous bands of a fainter appearance, form a kind of net-work,

in the meshes of which the new-formed substance is inclosed. This structure accords with what Dr. Bailley describes to be the case, in cancerous diseases of the stomach and uterus.

“In a further advanced stage of the tumour, the whole of the diseased part has a more uniform structure; no central point can be distinguished; the external edge is more defined, and distinct from the surrounding gland: and the ligamentous bands, in different directions, are very apparent, but do not follow any course that can be traced.

“When the tumour has advanced to what may be called cancerous suppuration, which, however, does not always happen in the centre, before it has approached the skin, and formed an external sore; it then exhibits an appearance totally different from what has been described. In the centre is a small irregular cavity, filled with a bloody fluid, the edges of which are ulcerated, jagged, and spongy. Beyond these, there is a radiated appearance of ligamentous bands, diverging towards the circumference; but, the tumour near the circumference is more compact, and is made up of distinct portions, each of which has a centre, surrounded by ligamentous bands, in concentric circles.

“In some instances, the scirrhus has no appearance of suppuration, or ulceration in the centre, but consists of a cyst, filled with a transparent fluid, and a fungous excrescence, projecting into this cavity, the lining of which is smooth and polished. When a large hydatid of this kind occurs, a number of very small ones have been found, in different parts of the same tumour; and, in other cases, there are many very small ones of the size of a pin's head, without a large one. These hydatids are certainly by no means, sufficiently frequent in

their occurrence to admit of their forming any part of the character of a cancerous tumour."

In some cases cysts exist of various forms and sizes, and in different parts of the tumour; a late writer (Dr. Adams) pronounces these to be living hydatids. When tumours are extirpated exhibiting these appearances, we may rest assured that they would never have been discussed and in all probability would have advanced to the state of true and malignant cancer.

We are not however always able to predict what tumours will become so, and what particular tumours may remain unsuspected. Mr. Home with great and commendable candour remarks, that so much does the same disease differ in its appearance in different patients, from the almost endless peculiarities of their constitutions, by which every part of their bodies must be more or less influenced, that it is not possible in practice to distinguish, in all cases, between cancerous and scrofulous tumours, after they have advanced to a certain stage, and he confesses that he has in many instances mistaken the one for the other, and has removed by operation tumours, which at the time had the appearance of being cancerous, but which upon examination after their removal were found of a scrofulous nature; and, on the other hand, he has neglected to remove tumours, from circumstances making it probable that they were scrofulous, which afterwards became cancerous and destroyed the patient.

Although surgeons generally have not confessed their mistakes, yet the immense disparity which appears in the record of their successes establishes the fact that Mr. Home has not been singular in confounding cancerous with other diseases. Mr. Nooth, for example, declares, that in one hundred and two cases in which he extirpated scirrhus tumours, every patient remained

free from a return of the complaint. Dr. Monro, on the contrary states, that of sixty cancers which he had seen extirpated, only four remained free of the disease for two years, and these afterwards became cancerous.

Mr. Hill, in his Cases of Surgery says, he had operated on eighty-eight genuine cancers, all ulcerated except four, and all his patients except two recovered of the operation; ten however had the disease afterwards in other places.

Among the diseases resembling cancer, Mr. Home describes one by which parts of a glandular nature are often attacked, as the alæ of the nose, the os tincæ and the glans penis;—this differs from cancer in not contaminating the surrounding parts, and in not affecting the absorbent glands, nor the skin at a distance; it is properly speaking an eating sore which is uniformly progressive; whereas in cancer, after the sore has made some progress, a ridge is formed upon the margin, and the ulceration no longer takes that direction. It also differs from cancer in admitting of a cure in many instances, and under different modes of treatment.

Cancer has by many writers been considered as a contagious disease, of this opinion there is however no well grounded proof. Some facts have been recorded which prove *disease* to have resulted from the application of cancerous matter to sound parts, but no instance has been produced in which a cancerous sore has been the consequence. Mr. Pearson who has treated this subject with great ingenuity, remarks, that “virulence and contagion are very different things; the bite of a viper, or the sting of a scorpion, may poison a part by the malignant quality of the venom that is injected, without communicating a contagious disease, and the fluid taken from a pustule or an ulcer, may erode a part by its che-

mical qualities, and yet the matter formed by this new sore shall not possess similar properties with that which produced the ulceration. It is not sufficient therefore to assert, that the fluid of a cancerous sore occasioned an ulcer in a sound person; it ought to be proved that the ulcer thus produced was truly cancerous."

Cancer has also been considered an hereditary disease. Mr. Home is inclined to believe that a predisposition to cancer, depending on local peculiarities of structure, may be transmitted from parents to their descendants, and in this sense of the word, the disease is no doubt hereditary. This idea originated with Mr. Hunter who illustrated it by observing that of fifty persons who may receive similar accidents in glandular parts, not more than one or two will be afflicted with subsequent cancers.

The disease occurs at almost every age; it is most frequent, however, in advanced life. The period of the cessation of the menses in women, is supposed very obnoxious to cancer. Dionis says that he saw very many women in the nunneries of France, afflicted with cancer, and that by much the greater part were between the ages of forty five and fifty, and that in those who had cancers at an earlier period the catamenia were either very irregular or had been entirely obstructed.

The female mamma is perhaps the most frequent seat of cancerous affections, and as this part is liable to several other diseases, it may not be improper to describe some, with which cancer has often been confounded.

In some cases the whole substance of the mamma will enlarge gradually till it acquires an enormous size, without very acute pain; the patient complains of great tenderness and soreness, but the greatest inconvenience is derived from the bulk and weight of the tumour; sometimes the swelling is attended with considerable heat

and redness of the part and symptomatic fever. The skin of the breast in many instances, is not at all discoloured, in some it is reddened. This complaint is not peculiar to married women but occurs also in the single.

In these cases copious depletion, and antiphlogistic measures, local and general, must be used, cupping, bleeding, purging, low diet, &c. They generally succeed, but even if they do not leave the breast of its usual size, the swelling has no cancerous tendency and remains without any inconvenience being sustained, but from its bulk and weight. These, however, are in themselves serious evils, and the breast is sometimes removed to relieve the patient from them. Under such circumstances no doubt of a recovery need exist.

A chronic inflammation sometimes occurs in the breast, producing considerable deep seated pain;—a tumour is felt very hard and deep in the substance of the mamma;—heat and throbbing are perceived, and sometimes shooting pains through the diseased part;—the skin generally retains its natural appearance, but if the disease advances to suppuration it becomes red and sore;—it attacks young women chiefly, and without any exciting cause being evident. Very copious depletion will generally prevent suppuration and relieve the patient. Local and general bleeding with the usual antiphlogistic means are to be tried, and if any hardness remain after their use, cicuta and mercury may be administered—and these generally produce a speedy absorption of the tumour.

The breasts of females like every other part of the body are liable to scrofula. Scrofulous tumours have been described by the ancient writers, under the name of spurious scirrhi; sometimes they commence so gra-

dually as to assume many of the appearances of scirrhus, but in general they may be distinguished.

Where the skin only is affected no danger of scirrhus exists. In scrofula the disease is more diffused, the skin soon becomes red, and the symptoms of inflammation are more rapid, and sometimes terminate very speedily in suppuration.

Where a number of tumours exist in the breast we may pronounce them in most cases to be certainly scrofulous.

Hydatids are sometimes found to constitute the tumours, which are removed as scirrh, these are not readily distinguished, and when extirpated there is no danger of a return of disease.

Notwithstanding this, it must be confessed that it is in many cases very difficult, nay in the present state of surgical knowledge, absolutely impossible to pronounce with certainty, what cases are scirrhus and what scrofulous. This should induce the surgeon in doubtful cases to choose the safest side, and to extirpate those tumours which have a suspicious aspect.

It is not necessary to say much of any remedy for cancer except the extirpation of the diseased parts. It will be sufficient to state that certain discutient, corrosive, and narcotic medicines, from the vegetable, animal, and mineral kingdoms have been employed, most of which have had a temporary reputation but do not at this time retain the confidence of medical men. The use of narcotics is proper with a view to alleviate pain, and corrosive medicines are sometimes employed to destroy fungous flesh from the surface of the sore; discutient applications, as has been already stated, have no effect upon genuine cancer.

The internal use of arsenic has lost its character as a remedy for cancer, and preparations of iron, a fashion-

able substitute, lately introduced by Mr. Carmichael, will no doubt speedily share the same fate.

The best mode of abating the pain of cancer is by a very abstemious diet; Mr. Pearson recommends a diet so low, as barely to support life, such as barley water, tea, &c. A milk and vegetable diet has relieved the agonies of many cancerous patients.

As local applications I subjoin the following list from the article Cancer in Rees' Cyclopaedia.—Fresh bruised hemlock leaves.—Scraped young carrots.—The fermenting poultice.—Finely levigated chalk.—Powdered charcoal.—Carbonic acid gas.—A watery solution of opium.—Liquid tar, or tar-water. The internal remedies which have been most beneficial are—Very small and long continued doses of arsenic.—Liberal doses of cicuta.—The free use of opium.—Belladonna.—Solanum.—Martial flowers.—Corosive sublimate.—The juice of clivers or goose-grass. But neither the external nor internal remedies, however apparently useful for a time, can be in the least depended on for the cure of a genuine confirmed cancer.

Where the operation is concluded on, it should be performed early, for authors agree that where the poison is absolutely formed, and the neighbouring parts contaminated, the prospect of success is greatly diminished, and in cancer of the breast where the glands of the axilla are affected, Mr. Cline and Mr. Home declare it too late to perform the operation with any "assurance of success."*—But experience warrants us in differing from the gentlemen whose names have been mentioned. In this country Dr. Physick has extirpated the breast in se-

* It is here necessary to state that the glands of the axilla may be enlarged from sympathy, in which case they vary in size at different times; where they are contaminated by the poison they gradually and uniformly increase, and the knife is often useless. To the latter case the present observations refer.

veral instances in which the glands of the axilla have been affected, and he has applied ligatures so as to eradicate these also. In some cases the disease has returned, but in several he has had the satisfaction to believe that life has been prolonged by the operation, and at the expiration of several years his patients remain free from all disease.

Two methods of extirpating tumours are in use. The knife and caustic. The advantages of the former are very great; the surgeon has it in his power to remove the whole of the diseased parts from the healthy, and the diseased may be discriminated in the course of his incisions, but with caustic it is impossible to judge precisely what parts will be removed. If, however, from the great terror of surgical operations which exists in some patients, or from any other cause, the caustic be preferred, Mr. Home recommends a preparation of equal parts of white arsenic and sulphur.

When the knife is to be used, the following are encouraging circumstances:—*First*, Where the diseased parts are so situated as that they may be removed without wounding any large blood-vessels and nerves, and where the whole of them may be completely eradicated. *Second*, Where the disease has resulted from accident, and has not occurred spontaneously. *Third*, Where the patient is in good general health. *Fourth*, Where the disease is slow in its progress, and has not contaminated the surrounding parts.

OF THE EXTIRPATION OF CANCEROUS BREASTS.

Previously to the operation, the parts should be examined with great attention, in order to ascertain the extent of the disease, and the surgeon in this, as in every operation for the removal of cancerous parts, should not

merely cut away the parts already indurated and diseased, but likewise some portion of the surrounding substance in which a diseased disposition may probably have been excited.

In performing the operation the patient is to be seated in a chair in a good light. If the skin be sound, and a tumour only exists in the breast, a straight incision may be made through it, and the diseased part dissected out. But if it is determined that a part of the skin should be removed with the tumour, two incisions are to be made, forming an oval figure between them, in which all the skin to be taken away, is included; and as dividing the skin is the most painful part of the operation, both these incisions should be completed before any thing else is done; and the lower part of the skin should be divided first, since, if a wound is made in the upper part, the effused blood covers the skin below, and prevents the surgeon from seeing accurately where the second incision ought to be made. These incisions should be nearly in the direction of the fibres of the pectoral muscle. If the glands in the axilla are diseased, the incision should be high enough in that direction to allow of their removal with the tumour. The best way to do this is to dissect the diseased breast out first, and then to dissect upwards, without cutting it off, and detach the hardened lymphatics and glands in the arm pit which will be pulled down by the weight of the tumour, and thus the operator will be enabled to extirpate them more conveniently. As soon as the fingers can be passed above the indurated axillary glands, they are to be cut off, but before this, the cellular membrane connecting them above is to be tied by a firm ligature, to prevent hemorrhage from any vessel that may be contained in it. This direction is of the utmost importance; for if it be neglected, the vessels will retract so high into the axilla, that the surgeon will

be unable to secure their orifices. When the tumour is taken out, the bleeding vessels should very carefully be tied, and the edges of the wound brought into contact, and kept so by adhesive plasters and compresses, so that as much as possible of the wound may unite by the first intention. The ligatures are to be left out at the angles of the wound.

Scirrhus tumours sometimes form in the neck, and when they are deeply seated great hazard attends their removal ; in general, however, the tumours found in the neck are of a scrofulous, and not a cancerous nature. Mr. Pearson denies that the absorbent glands, which are found indurated under the lower jaw, are in any case scirrhus, unless they have been contaminated by cancerous ulcers of the lip, tongue, or fauces. In some cases it is necessary to remove them, even when they are evidently not scirrhus, on account of their impeding the functions of respiration and deglutition, or because they compress the blood-vessels of the neck : no unpleasant consequences result from their extirpation, and the chief caution necessary is to avoid wounding the vessels.

THE PAROTID and SUBMAXILLARY GLANDS are often the seat of true cancer. The NOSE and other parts of the face are also occasionally attacked by cancerous ulcers. The term *noli me tangere* has been applied to some of these complaints. The ulcers described by different writers under this name, are so very various, that it is certain they have attached no precise idea to their definition. One author describes it as a disease of the nose exclusively.* Others have seen it on the legs and arms. The term LUPUS has been attached to it when in these latter situations. I am persuaded that the disease recently described by Mr. Hey and Mr. Burns under

* Cooper.

the titles of FUNGUS HEMATODES, and SPONGOID INFLAMMATION, are of the same nature, as many of the cases denominated by the older writers *noli me tangere*.

In many of these ulcers on the face, as well as in other situations, fungous granulations arise to a very great height, and their growth is in some cases so rapid that Wiseman asserts it to be obvious to the eye. The application of caustic has proved successful in some cases; where the whole of the diseased parts can be completely extirpated by the knife, they should be removed. In general, however, when the parotid gland is affected, this cannot be done, and the attempt will only aggravate the disease, and hasten its progress.

CANCER OF THE TONGUE is unusual, but is occasionally met with; Mr. Home has seen two cases of it, one of which occurred in a gentleman between fifty and sixty years of age. Upon dissection after death, a large gland was found under the coronoid process of the lower jaw, weighing two ounces and a half, all the lymphatics in the vicinity were diseased, and the cancer extended to the pharynx. As cancerous ulcers are probably in the present state of our knowledge incurable, and always unless the diseased parts are removed, terminate fatally, we should not hesitate to extirpate the tongue when affected with cancer; the mode of effecting this has already been described, it is however proper to add, that from the testimony of Desault and others, we learn, that patients in whom great portions of this important organ have been removed, have not entirely lost the power of speaking intelligibly.

The RECTUM is sometimes affected with scirrhus and cancer, no cases of recovery from this complaint are recorded. Opiate clysters, and opium, introduced in form

of pills into the rectum give great relief. The ulceration, in a case described by Mr. Home, extended through the bladder, and fæces were voided with the urine.

The TUNICA VAGINALIS TESTIS has been found cancerous. Mr. Hunter once extirpated nearly the whole of it in a scirrhus state.

The BLADDER is liable to cancer. Gooch relates a case in which the bladder of a boy, only eight years of age, was affected with scirrhus,—he died,—and upon examination, the bladder was found thickened and contracted, so as to resemble “the gizzard of a fowl,” and was incapable of containing more than a spoonful of urine; it contained two calculi.

CANCER OF THE PENIS is not unfrequent, it commences usually with a wart or tubercle on the prepuce, frenum, or glands. This often remains quiescent for many years, but if irritated becomes painful, increases in bulk, and attains in a short time a very large size. Ulceration takes place attended with a discharge of fetid sanies. When the ulcer continues long, the urethra is exposed and fistulous openings form, through which the urine flows, and the disease is aggravated. The glands in the groin and upon the ossa pubis are affected, and the disease extends in their course. To distinguish venereal warts from those tending to cancer is in general not difficult; and when the cancer exists, the penis should be removed before contamination is gone too far.

Mr. Hey has published seven cases of cancer penis, in six of which the patients had a natural phymosis. He remarks that the occurrence is extraordinary if it have no connection with the disease. In six of these cases Mr.

Hey effected a cure by amputation. In the seventh the disease recurred.

The amputation of the penis is to be performed whenever the disease is evidently of a cancerous nature. The operation is very simple, a circular incision is to be made through the skin, with a bistoury at some distance (half an inch if practicable) from the diseased part, the skin is to be drawn back a little, and the body of the penis cut through with one even stroke of the knife, at the part to which the skin has been retracted. The bleeding vessels are then to be secured with ligatures. Three principal vessels are to be looked for, one on the dorsum penis, and one in each corpus cavernosum. An elastic catheter is now to be introduced into the urethra, and the skin drawn forward so as to cover the stump, and secured in this situation with strips of adhesive plaster. The catheter is objected to by Mr. Pearson, but in some cases where it has been omitted the external aperture of the urethra has been greatly contracted by the healing of the wound. After the first dressing is removed, a pledgit of simple cerate is to be applied and renewed as often as may be necessary.

Mr. Hey says that in amputating the penis he has found great advantage from having wrapped some tape round the sound part; in this way he was enabled to divide the integuments more easily and correctly, and he was also furnished with a useful kind of tourniquet, which secured the divided vessels from bleeding, till he was prepared to take them up with the tenaculum and ligature. He remarks, that "it requires great care to secure the larger arteries, as they are apt to shrink and conceal themselves under the loose integuments to which they have no strong attachment."

CANCER OF THE UTERUS though a rare, is a deplorable

and hopeless case. The use of all irritating injections is improper. The greatest benefit will be derived from a strict adherence to a very low diet. Pain is to be relieved by the administration of opium. I have relieved the pain in one case very considerably by injections of warm barley water thrown up the vagina. An aqueous infusion of opium may be substituted if the barley water should not answer the purpose. Anodyne enemata are also very often necessary.

The SCIRRHOUS TESTICLE is a frequent disease, and sooner or later ends in cancer unless extirpated. Mr. Potts' description of this complaint is extremely accurate "When the testicle becomes enlarged in size,—hardened in texture,—craggy and unequal on its surface,—painful on being handled,—attended with irregular pains shooting up the groin into the back, and this without any previous inflammation, disease, or external violence, the testicle is said to be affected with a scirrhus"—he further adds that in such cases early castration may be recommended and practised by every honest and judicious surgeon.

If this is neglected—hectic supervenes—ulceration takes place—a fungus shoots out from the surface of the testicle, and the patient falls a victim to the neglect of his case.

There are several diseases of the testis comprized under the general name of SARCOCELE which it is important to distinguish from cancer. Hernia humoralis in its recent stage cannot be mistaken for scirrhus, but after the acute symptoms subside a great degree of induration remains, with an enlargement and unequal surface. The epididimis often continues hardened for some months, but generally we are able to produce resolution, or if the testicle even suppurates the abscess very

readily heals without occasioning much general disease. None of the symptoms of scirrhus exist in this case, as the pain ceases and the hardness subsides.

A *scrofulous tumour* of the testis is described by writers which exists either in the spermatic cord, the epididymis, or the body of the testicle. This may also be distinguished. Here the inflammation runs higher, and comes on more rapidly than in cancer, the system sympathizes, and fever is produced, the pain is very obtuse, and rather deserves the name of soreness than of pain. This complaint gets well very readily in some cases, and is reproduced by exposure to cold or intemperance, and suppuration, with collections of matter take place in various parts of the scrotum.

A disease described by Mr. Abernethy under the name of medullary sarcoma, may not improperly be noticed here. It has been called soft cancer, and appears to be as malignant and incurable as that which has already been described. The following case from Abernethy's writings will convey a clear history of the disease.

“A tall, thin, healthy-looking man, of about forty years of age, had, about fifteen years before, a swelled testicle from a gonorrhœa; the epididymis remained indurated. Six years afterwards it became enlarged, and a hydrocele at the same time formed. Half a pint of water was discharged by a puncture, but inflammation succeeded the operation, and the testis became very large. An abscess formed, and burst in the front of the scrotum, and the testis subsided in some degree. Mercury was employed to reduce it, but without effect. The part, however, was indolent, and gave the patient no trouble but from its bulk.

“About a year afterwards, a gland enlarged in the left groin (the same side as the testis :) another then be-

came swollen in the right groin, and, in the course of two years, several glands in each groin had obtained a very considerable magnitude. At this period, he was admitted into St. Bartholomew's Hospital, under the care of Mr. Long. The testis was at this time, between four and five inches in length, and about three in breadth; it resembled its natural form and was indolent in its disposition. The spermatic cord was thickened, but not much indurated. Four or five glands were enlarged in the groin on both sides; each of which was of the size of a very large orange; and when observed together, they formed a tumour of very uncommon shape and magnitude.

“They gradually increased in size for several months, till at last the skin appeared as if unable to contain them any longer. It became thin, inflamed, and ulcerated, first in the left groin, and thus exposed one of the most prominent tumours. The exposed tumour inflamed and sloughed progressively, till it entirely came away. As the sloughing exposed its vessels, which were large, they bled profusely, in so much that the students endeavoured, but in vain, to secure them by ligatures: for the substance of the tumour was cut through, and torn away in the attempt. Pressure by the finger, continued for some time, was the only effectual mode of restraining this hemorrhage.

“The loss of one gland relieved the distended skin, which had only ulcerated in the most prominent part of the tumour, and had not become diseased. It now lost its inflamed aspect; granulations formed, and a cicatrix took place. In the opposite groin a similar occurrence happened. One gland, exposed by the ulceration of the skin sloughed out, being attended by the circumstances just recited. However, before the skin cicatrized, ulceration had again taken place in the right groin, in con-

sequence of the great distension of the skin from the growth of the tumour, and sloughing had begun in the tumour, when the patient, whose vital powers had long been greatly exhausted, died."

Mr. Ramsden of London has recently published some very valuable observations on certain diseases of the testicle. In the preface to this work he attempts to prove, that genuine cancer of the testicle is extremely rare; that most of the cases of sarcocele which have been mistaken for it, arise from latent irritation in the urethra; he does not deny that the testicle is liable to scirrhus and to sarcocele, both of which may lead to an untractable state of ulceration, but he believes that "*the malignancy of the ulcerative stage of true scirrhus* in the testicle, does not, as has been supposed, depend on the presence of any morbid poison, but differs from the *malignancy of the ulcerative stage of the common indurated testicle* merely with regard to the part of the gland in which irritation causing its derangement has been primarily established. In illustrating this opinion, it is to be remarked that when a testicle is effected by true scirrhus, as it is termed, its morbid ulceration will be found to originate within its organic structure; but when the gland becomes indurated and enlarged, in consequence of exterior causes of excitements, the morbid symptoms are, in the first instance, entirely confined to the surrounding or intervening cellular substance. And hence, alone, it is that scirrhus is attended at an early period with a peculiar sallowness of countenance, and other symptoms of derangement in the system; while the common indurated testicle will exist, and frequently advance to a great extent, without at all interfering with the general health of the patient."

There can be no question as to the propriety of employing bougies in order to dilate a stricture of the ure-

thra if it exist, but the extirpation of the testicle is not the less necessary because the incurable disease has been excited by "a latent principle of irritation in the urethra."

The testis is doubtless liable to very numerous diseases, some of which have never been sufficiently investigated; one of these is an obstinate sinuous ulcer, which resists every caustic application, and refuses to heal even when all the diseased parts are, to all appearance, dissected or burnt out. Another is the fungous tumour which has lately excited some attention, and on which Mr. Lawrence has recently published a paper which I have not been able to procure. This fungous tumour I have known cured in a variety of cases, by the application of white oxyd of arsenic (or arsenious acid) a remedy, therefore, which I take the liberty to recommend, previously to removing the parts by the knife, which has been the general practice.

OPERATION.

The extirpation of the testis, when necessary, is an operation by no means difficult. The skin of the scrotum becomes contaminated sooner than any other part in the vicinity, and therefore the first thing, as Mr. Home remarks, is to mark out that portion of skin which ought to be removed. "This being done, the next thing is to dissect out the diseased testicle from its situation in the scrotum, taking care that the incision should always be in the sound and natural parts and that every thing connected with the disease is left attached to the testicle itself. Having gone thus far, the cord is to be examined, and dissected as high up as is necessary to come at a sound part, which, in the exposed state it is now in, detached from the skin and surrounding parts, can readily

be ascertained. All that is necessary to complete the operation is tying the cord, which is best done by passing a needle, armed with a double ligature, through it, in the interstice between the portion composed of the vas deferens and spermatic artery, and the loose veins and other parts, which, in a diseased state of the testicle, are found much increased in size, and very vascular. These ligatures are to be tied sufficiently tight to deaden the substance which is included in them, and then the cord is to be divided.

“The cut edges of the scrotum are to be brought together, and retained there by needle and ligature, adhesive plaster, or, simply by compresses of lint, according to the peculiar circumstances of the case.

“It is a common practice, which is adopted by surgeons of eminence, to cut down upon the cord, in the first instance; and, after exposing it for an inch in length, to pass a ligature behind it; and, having thus included the cord, and secured the spermatic artery, divide it below the ligature, and afterwards dissect out the testicle, like any other detached tumour. The motives for this practice are founded in humanity, since the moment the nerves of the testicle are cut through the patient will be sensible of no material pain during the rest of the operation. This advantage appears to me to be more than counterbalanced by the risk there is of the operation not being completed in the most satisfactory manner.

“The first consideration in every operation in surgery is, that it should be so performed as to leave nothing to chance, and that the patient should have every security that the operation can afford him; its being done with a less or greater degree of pain, however desirable it may be that it should be as small as possible, is therefore only a secondary consideration.

“From not seeing operations in this extensive view,

young surgeons, upon slight grounds, are induced by theoretical opinions, to vary their mode of performing them, and too often make themselves liable to meet with more serious difficulties than those which they feared to encounter.

“In this operation it is even recommended to cut down upon the cord, expose the spermatic artery, include it by itself in a ligature ; and, by this neat and delicate operation, save the patient much pain. Those cases, however, which require an operation, have the cord much thickened, and consequently much more vascular than in its natural state. I have known a surgeon take up the spermatic artery alone, then five or six vessels one by one ; and, after having kept the patient the time necessary for this purpose, find himself obliged to include the whole cord in a strong ligature, so many other vessels continued to bleed.” (HOME.)

I wish merely to add to Mr. Home’s account of this operation, that the best mode of tying the cord, is in my opinion to pass one strong ligature round the whole of it, including every nerve and vessel in it. The pain is not augmented, nor its duration increased by this, and the operation is greatly expedited by it. In making the first incision I would also recommend to carry the edge of the knife into the substance of the testis, which will immediately demonstrate the nature of the tumour, and will certainly divide all the investing membranes, which it is useless to do by a slow, cautious, and painful dissection.

CHAPTER II.

Of Fungus Hematodes.

WITHIN a few years much attention has been paid to a disease which has received the appellation of fungus hematodes, a soft cancer. Mr. Burns of Glasgow, is the first writer who has given an exact account of it. He states that "it generally begins with a small colourless tumour which is soft and elastic, if there be no thick covering over it, such as a fascia; but otherwise is tense. At first, it is free from uneasiness; but, by degrees, a sharp acute pain darts occasionally through it, more and more frequently, and at length becomes incessant. For a considerable time, the tumour is smooth and even; but, afterwards, it projects irregularly in one, or more points; and the skin at this place becomes of a livid red colour, and feels thinner. In this place it easily yields to pressure, but instantly bounds up again. Small openings now form in these projections, through which is discharged a thin bloody matter. Almost immediately after these tumours burst, a small fungus protrudes, like a papilla, and this rapidly increases, both in breadth and height, and has exactly the appearance of a carcinomatous fungus and frequently bleeds profusely. The matter is thin, and exceedingly fetid, and the pain becomes of the smarting kind. The integuments, for a little around the ulcers, are red, and tender: after ulceration takes place, the neighbouring glands swell, and assume exactly the spongy qualities of the primary tumour. If the patient still survive the disease in its present advanced progress, similar tumours form in other parts of the body, and the patient dies hectic.

“After death, or amputation, the tumour is found to consist of a soft substance, somewhat like the brain, of a grayish colour, and greasy appearance, with thin membrane-like divisions running through it, and cells or abscesses in different places, containing a thin bloody matter, occasionally in very considerable quantity. There does not seem uniformly to be any entire cyst, surrounding the tumour; for it very frequently dives down betwixt the muscles, or down to the bone, to which it often appears to adhere. The neighbouring muscles are of a pale colour and loose their fibrous appearance, becoming more like liver, than muscle. The bones are always carious in the vicinity of these tumours.

“The distemper is sometimes caused by external violence, though in general there is no evident cause whatever.” I fully agree with Mr. Wardrop in considering this affection distinct from cancer, although in some respects they are very similar. They differ in structure very materially; in the symptoms which arise; in the parts usually attacked, and in the periods of life at which they occur. (See Wardrop on fungus hematodes, or soft cancer.)

The fungus hematodes occurs in different parts of the body. I have seen one case in which it sprouted from under the tendon of the biceps flexor cruris, and in another its situation was so high in the arm, that amputation was performed very near the shoulder joint, and a third case in which I have been obliged to amputate at the shoulder.

Mr. Hey has seen it in the female breast; in the leg, neck and arm; on the back of the shoulder, and he thinks, also in the eye. Mr. Burns has seen it in the hip joint; upon dissection he found the joint surrounded with a soft matter resembling the brain enclosed in thin cells, and here and there, cells full of thin bloody water:

the head of the thigh bone and the acetabulum were carious. Mr. Wardrop describes cases in which it occurred in the eye, the testicle, the liver, the spleen, kidneys, lungs, uterus and ovaria.

With respect to the treatment of fungus hematodes, it must be confessed that there is no remedy but an entire extirpation of all the affected parts, and unfortunately, the patient often opposes this decisive practice in the commencement of the disease, which is the most proper time for it. Mr. Hey has applied numerous escharotics without the effect of checking the growth of the tumour. When the disease is seated on a limb, it ought, if possible, to be removed without amputation. Not a vestige of morbid structure should be left after the operation, but the incisions should be made in sound parts, and if notwithstanding this, the disease should be reproduced, amputation ought to be performed without delay. Wherever the disease is seated, the parts ought to be freely and carefully removed.

CHAPTER III.

Of Hernia.

THE large proportion of mankind who are afflicted with this complaint;—the great variety of forms in which it appears;—the fatality which results from its improper treatment, and the ample resources of surgery in preventing its evil consequences, are circumstances which combine to render the investigation of hernia peculiarly interesting.

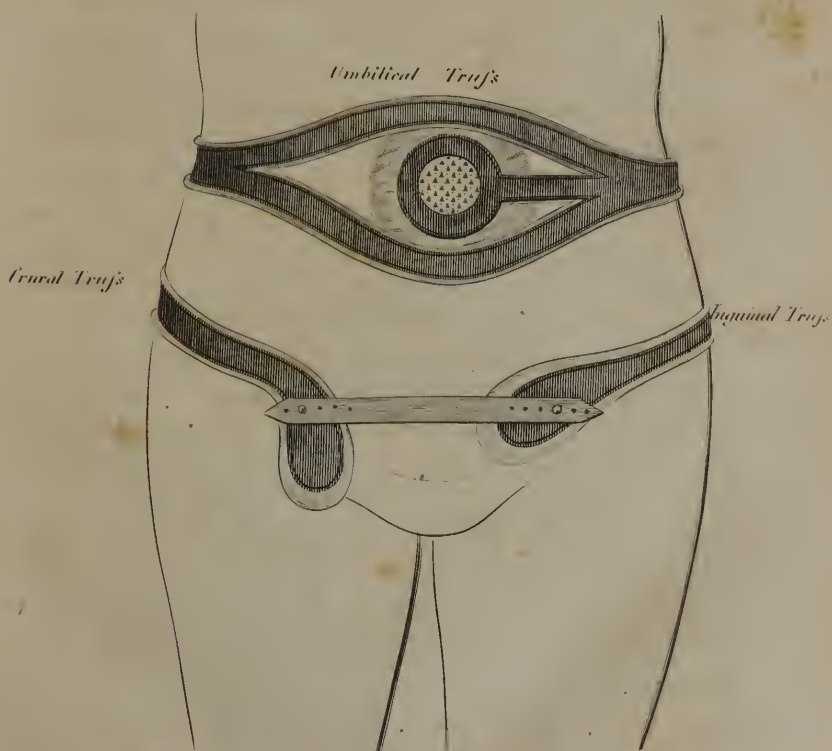
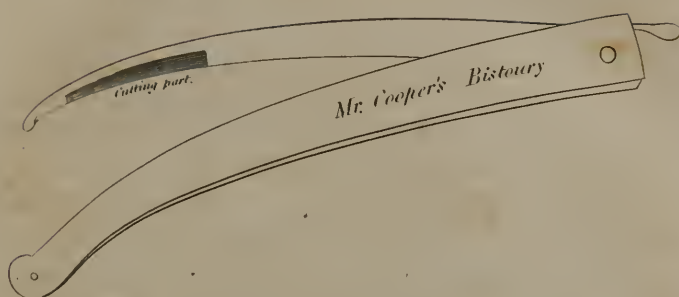
It has been estimated that nearly one fifteenth part of the inhabitants of Great Britain, of Spain, and of Italy, are affected with hernia, and one thirtieth of the population in the north of Europe. The proportion in America, I am persuaded, is by no means so great; but it is nevertheless a very frequent disease, occurring in both sexes, at every age, and in every rank of society.

A HERNIA, OR RUPTURE, signifies a protrusion of any of the contents of the abdomen, through the parietes of that cavity.* The parts at which this protrusion occurs, and the particular viscera which are thus displaced, are various.

The peritoneum which lines the cavity of the abdomen is generally pushed out together with the viscera, forming a bag called the hernial sac, which is a cavity continued from that of the abdomen and lined by the same membrane.

* Dr. Monro in order to include every species of hernia in a definition, calls it "a tumour unconnected with a wound, and produced by a bowel, or part of a bowel, which is not situated in its natural place, and the tumour may be either external or internal." It is useless to be fastidious respecting definitions; they are very seldom perfect.

Hernia.



In general the bowels are protruded at some *natural* opening, as the abdominal ring, or crural arch; by the term *opening*, in this place, is not meant any absolute hole or aperture, because in a natural state these parts are filled up with cellular texture, but this texture being less dense and resisting than the neighbouring parts, yields more readily. Sometimes the hernia occurs at a *præternatural* opening, in some part of the abdomen.

The hernial sac, after passing out at the aperture through which it has been forced, gradually enlarges, in consequence of the action of the muscles of the abdomen, which augments its contents, and of other causes. The cellular membrane in the vicinity gives but little resistance to this enlargement; the part of the sac, however, which is surrounded by the firm parietes of the abdomen, is prevented from yielding, and remains of a smaller diameter than the rest of the sac, forming what is called its *neck*;—the extremity most distant from the neck is called the *fundus* of the sac.

This sac varies greatly in density, not so much from an alteration in the thickness of the peritoneum itself, as from the layers of condensed cellular texture which are connected with it. In very old ruptures the hernial sac is sometimes very dense, it has been known half an inch in thickness; but, in other cases, a contrary state of the sac is found, and it appears to be almost entirely destroyed. In old umbilical herniæ it is often extremely thin, and cases are recorded in which no sac could be found; in these cases it had probably been absorbed, in consequence of pressure, which we know sometimes occasions an absorption, and sometimes a thickening of the compressed parts.*

* The sternum is absorbed from the pressure of an aneurism of the aorta, and the soles of the feet are covered with a very thick skin, in consequence of compression from the weight of the body

“ We should hardly have supposed, *a priori*, that the peritoneum is susceptible of such considerable extension as it frequently suffers in cases of hernia. Scrotal ruptures often descend to various distances on the thigh, sometimes indeed even to the knee ; yet the whole inner surface of the bag, in which all the loose viscera of the abdomen may be contained, is lined by a continuation of peritoneum ; indeed, the hernial sac is generally thicker and stronger in proportion to the size of the tumour, and to the duration of the complaint. Yet, occasionally, instead of an increased thickness, we observe the opposite process of absorption or thinning, in large ruptures : in some cases the coverings are so reduced, that the convolutions and vermicular motions of the intestines may be distinguished through the skin ; hence it may appear, that the sac is entirely wanting ; but it will be possible to trace it in the neighbourhood of the opening. The contents of a rupture may be found immediately under the skin, when the hernial sac has been burst by a blow ; but this is an unfrequent occurrence.

“ The exterior covering is every where closely connected by cellular substance to the proper peritoneal sac. Hence the latter part is not returned into the abdomen, when the contents of the swelling are replaced ; but remains behind, ready to receive any future protrusion. At the first moment of the occurrence of a hernia, the protruded peritoneum must of course be unconnected to the parts among which it lies. But adhesions take place so quickly that we find the sac universally connected to the contiguous parts, even in a rupture of a few days standing : and these connections become afterwards so strong and general, that we might suppose the hernial sac to have been originally formed in its unnatural situation. The difficulty, which this structure would occasion, in separating the hernial sac from the surrounding

parts, and particularly from the spermatic cord, constitutes an insuperable objection to any proposal for returning the sac into the abdomen, and must have been a source of great danger in some of the old methods of attempting the radical cure of ruptures." (LAWRENCE.)

All abdominal herniæ are to be considered as having sacs, except those which are consequent to wounds or preternatural openings in the parietes of the abdomen, and those in which the sac has been absorbed. Hernia of the bladder has no sac, because its situation is exterior to the peritoneum.

"The contents of a hernial sac are some part or parts ordinarily contained in the abdomen; and commonly the omentum or intestines. These are the most moveable viscera, and occupy the front and lower part of the belly: their relative position explains, why, in a mixed case, the latter are covered by the former. The small intestine, from the greater looseness of its connexion, is more frequently protruded than the large; and the ileum more frequently than the jejunum, in consequence of its greater proximity to the ring and crural arch. A part only of the diameter of the tube is sometimes included in a hernia; any larger quantity may descend from a single fold to the whole moveable portion of the canal. Adipous matter is generally deposited in large quantities in the omentum of fat and elderly persons; and in this state it escapes very readily from the cavity. Protrusion of the large intestines consists, generally, either, of the cæcum, or sigmoid flexure of the colon; as these are the least fixed portions of the canal. When the former part descends, it is ordinarily, as we should expect, on the right side; when the latter, on the left. Yet the cæcum and vermiform appendix have been seen in ruptures of the left side; and when we consider that the intestines may descend to the knees, dragging even the sto-

mach to the pubes, we shall be convinced that the natural position of an organ cannot of itself, enable us to determine at which opening it may be protruded.

“Other abdominal viscera, besides the intestines and omentum, may be protruded in hernia. The urinary bladder sometimes passes through the abdominal ring. The ovaries, and uterus, the spleen and stomach, have been very rarely seen in ruptures.” (LAWRENCE.)

Herniæ derive different appellations from the part at which the intestines protrude, from the situation in which they make their external appearance, and from the parts contained within the hernial sac. **INGUINAL HERNIA** denotes a protrusion at the abdominal ring, forming a tumour in the groin, this hernia is also called **BUBONOCÉLE**. In the male the tumour extending down into the scrotum is called **OSCHEOCÉLE** or **SCROTAL HERNIA**. In **FEMORAL** or **CRURAL HERNIA** (sometimes called **MERO-CÉLE**) the protrusion takes place under the crural arch. **EXOMPHALOS**, **OMPHALOCÉLE**, or **UMBILICAL HERNIA**, is that rupture which takes place at the navel. In any other part of the abdominal parietes, herniæ are called **VENTRAL**.

HERNIA CONGENITA is that in which the tunica vaginalis testis, forms the hernial sac, the testis and intestine being in contact.

In addition to these more common cases of herniæ, there are some rare species which deserve to be mentioned, as **HERNIA OF THE PERINEUM**, where the parts are protruded by the side of the bladder or vagina, or, a tumour may be formed in any part of the vagina, forming vaginal hernia. The ischiatic rupture, and that of the foramen ovale, take place through these respective openings of the pelvis.

When the sac contains omentum, the case is called **EPIPLOCELE**, or omental hernia; when intestine, **ENTERO-**

CELE or intestinal hernia; when both these parts are contained in the sac, it constitutes ENTERO-EPIPOCELE. A protrusion of the urinary bladder forms CYSTOCELE, or hernia vesciæ.

Hernia are REDUCIBLE when the parts can be passed up into the abdomen. When from having contracted adhesion, or being greatly enlarged, they cannot be returned, they are said to be IRREDUCIBLE. When they are irreducible in consequence of a stricture formed at the orifice through which the viscera protruded, the hernia is said to be STRANGULATED, or INCARCERATED.

The *causes* of hernia, are, *predisposing debility* of any particular part of the parietes of the abdomen, whether natural, or the consequence of morbid affections—and violent efforts by which the muscles of the abdomen are made to contract forcibly upon their contents—lifting heavy weights,—jumping,—running,—violent coughing, parturition—vomiting—straining at stool, and many other analogous exertions of the muscles; these are the *occasional causes* of hernia.

CHAPTER IV.

Symptoms of Reducible Hernia.

A TUMOUR is observed at the place of protrusion, free from pain, and generally soft, the colour of the skin being unaltered. This swelling varies in size, being smaller in a recumbent, than in an erect posture, and the patient is generally able by lying down to return the parts into the belly, the tumour entirely subsiding. The swelling increases when the patient is flatulent; sometimes a rumbling sensation is perceived in it, occasioned by wind. Coughing, sneezing, or any effort of the abdominal muscle produces an increase and tension of the swelling. These symptoms are more or less evident in different cases, they are not all observable in every instance.

“The symptoms of the case will sometimes inform us what are the contained parts. This discrimination, indeed, is often difficult, and even impossible, when the hernia is old, large, and very tense. For the viscera in such ruptures experience considerable changes in their figure and state, while the thickened hernial sac prevents an accurate examination by the hand. Again it is frequently hard to determine the contents of a very small hernia.

“If the surface of the tumour be uniform; if it be elastic to the touch; if it become tense and enlarged when the patient is troubled with wind, holds his breath, or coughs; if in the latter case, the tumour feel as if it were inflated; if the part return with a peculiar noise, and pass through the opening at once, the contents of the swelling are intestine. If the tumour be compressi-

ble ; if it feel flabby and uneven on the surface ; if it be free from tension, under the circumstances just enumerated ; if it return without any noise, and pass up very gradually, the case may be considered an epiplocele.

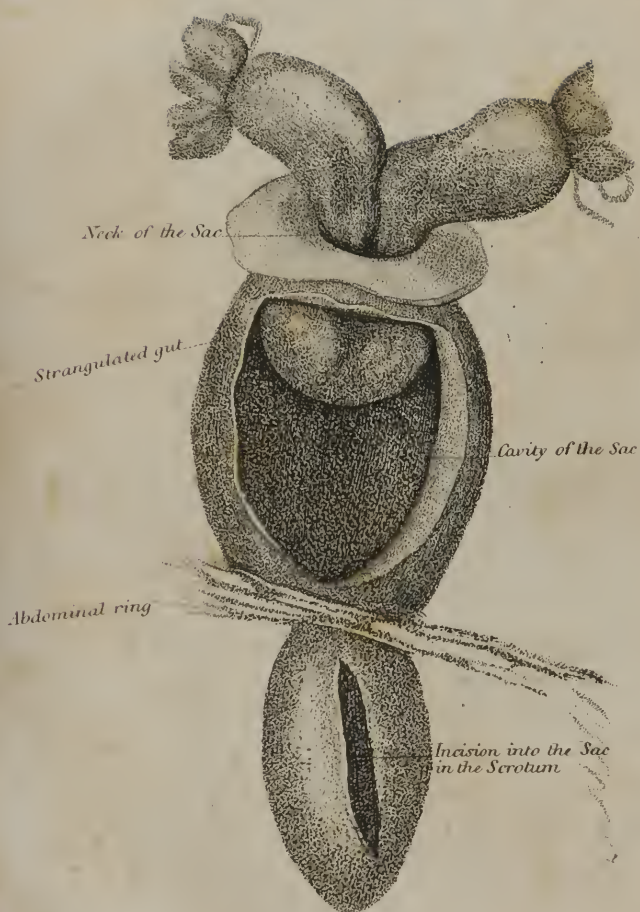
“The smooth and slippery surface of the intestine makes its reduction easier ; and the mixture of air with the intestinal contents, causes, when they are pressed up, a peculiar gurgling noise, (*Gargouillement* of the French.) The reduction of the omentum is more difficult, since it is soft and uneven, and its surface becomes moulded by the surrounding parts. If a portion of the contents slip up quickly, and with noise, leaving behind something which is less easily reduced, the case is probably an entero-epiplocele.” (LAWRENCE.)

This, however, is only probable evidence, and should not be depended on with too much confidence. The symptoms enumerated are, however, amply sufficient to enable us to discriminate between hernia and all other diseases, except in very particular cases where the tumour is small and deeply seated, has arisen very gradually, is connected with other tumours, and contains much fluid, &c. In a fat patient the difficulty of discrimination is considerably augmented.

“A reducible hernia, though attended with no immediate danger, occasions much trouble to the patient, particularly if it be allowed to proceed unrestrained by surgical treatment : and the inconvenience increases constantly with the size of the tumour. The portion of intestine or omentum, which has left the abdomen, produces various complaints, from its connexion with the parts within. From this source of irritation proceed nausea and vomiting, indigestion and colic. As the viscera become accustomed to their unnatural situation,

these symptoms gradually wear away. Still, as the tumour constantly increases in size, a large part of the viscera is deprived of that pressure and support, which it naturally derives from the respiratory muscles; the passage of the food through the alimentary canal becomes difficult and protracted; and hence large ruptures are almost invariably attended with flatulency and constipation. The patient is precluded from all active and laborious employments, and from all considerable exertions, which necessarily augment the tumour, and are attended with great risk of more immediate danger, by forcing down fresh parts, so as to cause strangulation. The opening through which the viscera pass out, must subject them to more or less pressure; which will enable us to account for that effusion of fluid into the cavity of the sac, which is generally observed in old ruptures; and for the formation of those adhesions of the parts to each other, and to the hernial sac, which change the case from a reducible swelling to one which will no longer admit of reduction. Since the opening becomes enlarged by the protruded parts, and the pressure on the viscera, which causes the descent, is frequently renewed, additions to the tumour take place very readily. In situations where position is favourable, and the surrounding parts offer no obstacle, as in the scrotum, the only limit to the possible bulk of a rupture arises from the connexions of the parts within. Instances are not uncommon, where all the moveable viscera have been contained in such a swelling; and even those which are more fixed may be gradually displaced, by the constant dragging of organs connected with them." (LAWRENCE.)

PLATE XVIII.



J.S. Dorsey del. & Sc.

CHAPTER V.

Symptoms of Strangulated Hernia.

“THE first and most immediate effects of such a degree of pressure, as prevents the return of the protruded parts, are an obstruction to the passage of the intestinal contents, and consequent want of fecal evacuations; and a more or less violent inflammation in the strangulated part. The former symptom may not be so clearly marked where a part only of the diameter of the gut is strangulated, but it will often occur to as great a degree in that case, and will be equally insuperable by purgative medicines, as where a complete fold of intestine is included: it even happens occasionally in a mere epiplocele, where no intestine at all is protruded. Hence it must be referred rather to that inflammatory affection of the intestines, which subsists in this complaint, than to the mechanical obstruction of the canal: and must be considered as analogous to the constipation which prevails in ileus, when produced by other causes. The action of clysters on the bowels below the stricture often produces a stool after the strangulation has taken place. But when these have been once emptied, the most irritating clysters produce no effect. The inflammation of the protruded viscera causes a thickening of their coats, an effusion of fluid into the hernial sac, and adhesions of the parts to each other, and to the containing bag. When it is particularly violent a layer of coagulating lymph is sometimes thrown out on the surface of the intestine. A manifest impression is often made on the intestine by the stricture, and this may proceed so far

as to cause a considerable constriction of the canal. It terminates at last, unless the stricture be previously removed, in gangrene. These, which we may call the primary effects of the incarceration, are accompanied by other symptoms, arising from disorder of the parts which sympathize with the hernia.

“In an incarcerated intestinal rupture, the tumour which was before indolent, becomes painful; the pain is most acute at the strictured portion, and extends from that situation over the rest of the swelling and abdomen; these parts becoming at the same time swollen and tense. A feeling of tightness, as if from a chord drawn across the upper part of the belly, is often one of the earliest symptoms of strangulation. The pain, which at first is not constant, becomes in the sequel fixed; and is augmented by external pressure, coughing, sneezing, or other agitations of the body. The evacuations per anum are entirely suppressed, and nausea and vomiting ensue: all the contents of the stomach, and afterwards those of the intestine, down to the stricture, being rejected. These symptoms, which often remit for a considerable period, are accompanied with a proportionate derangement of the whole system. There is a great anxiety and restlessness, with a small, quick and hard pulse, and coldness of the extremities. The pulse cannot be at all depended on, as indicating the degree of general fever. It may be even slower than in health, when the patient is in the greatest danger. Neither does the degree of heat, as ascertained by our examination, or indicated by the patients sensations, correspond to fevers in general: on the contrary there is a disposition to cold sweats, and a cold state of the extremities. After a time hiccough supervenes, the pulse becomes so small as hardly to be sensible, the respiration is weak, and the whole body is covered by a cold and clammy sweat. Mortification now

takes place ; it begins in the contents of the rupture, and extends to the containing and neighbouring parts. The degree and intensity of the symptoms are modified by various circumstances, as the age and strength of the patient, the nature of the strangulation, &c. The duration of the complaint, from its first commencement to the termination in mortification or death, is also extremely various.

“An epiplocele is much less liable to strangulation than an intestinal rupture, and its symptoms are milder and slower in their progress. In this variety of the complaint, stools may generally be procured by purgative medicines or clysters. The connexion of the omentum with the stomach induces hiccough and sickness, and although the latter symptom seldom proceeds to stercoraceous vomiting, it exists to a most distressing degree, and particularly characterizes the complaint. The symptoms are often influenced by the position of the body, being mitigated by bending, and aggravated by straightening the trunk. An epiplocele is occasionally accompanied with all the dangerous and alarming symptoms of an intestinal rupture, as insuperable constipation, fecal vomiting, &c.

“The examination of a patient, who dies while labouring under a strangulated hernia, discloses such a state of parts as the symptoms just enumerated would naturally lead us to expect. The whole surface of the peritoneum is inflamed, and the intestines participate in this disorder, particularly that portion of the canal which is above the stricture, which is distended considerably beyond its natural diameter. From the constricted part downwards, the intestine is generally smaller than usual, and not inflamed. The convolutions of the intestinal canal are agglutinated by a recent deposition of coagulating lymph ; and a turbid puriform fluid, with coagu-

lated flakes, is effused into the abdomen; streaks of a bright and red colour, consisting of an aggregation of minute vessels, cross the intestines in different directions; and spots of gangrene are not unfrequently observed. All these circumstances show us most decidedly that the effects caused by strangulation are of the most active inflammatory kind. We must regard the stricture, which the protruded parts experience, as the immediate cause of this disorder.

“The distinction of strangulation, from affections which may resemble it more or less nearly, requires considerable attention and judgment. The intestine included in a large hernia may be affected with colic, and thus giving rise to constipation and vomiting. This may the more easily be mistaken for strangulation, if the parts are adherent, and incapable of reduction. Such an attack may render a reducible hernia incapable of being replaced; particularly if the bowels are much inflated. Clysters and oily purgatives will produce stools under these circumstances, and thereby throw light on the real nature of the case.

“The first appearance of a rupture may occasion hicough, vomiting, and the same symptoms may be exhibited in an old case, after the patient has taken much exercise, or remained long in the erect posture, in consequence of irritation, excited by the protruded viscera in the contents of the abdomen. Here too stools may be easily procured by purgatives.”

“The most important case, however, is where a patient with a rupture has an attack of ileus from some other cause, in which the original complaint is not at all concerned. The operation, performed on the supposition that the symptoms arise from the hernia, would here be not only useless, but even injurious; and the

surgeon would neglect those means, which the inflammation of the bowels so urgently demands.

“Whenever we see a patient labouring under the symptoms of ileus, we should suspect the existence of a rupture, and make those inquiries and examinations, which such a suspicion would naturally suggest, particularly in females, who are often led to concealment by motives of false delicacy. A superficial examination is not sufficient on these occasions ; as a very small portion of intestine, not forming an external tumour, may, by its incarceration, cause the symptoms. If the latter have appeared suddenly, and under circumstances which might cause a rupture ; if the pain have been first felt about the ring or crural arch, and if pressure in these situations increase it ; and, lastly, if the patient, shortly before, had been in perfect health, there is strong reason to suspect the existence of a hernia.

“When a person labouring under ileus has a hernia, which can be reduced easily, there is no ground for doubt ; if, on the contrary, the parts cannot be replaced, strangulation may be reasonably suspected, although we cannot immediately conclude, with certainty, that the swelling is the cause of the inflammation. We should first ascertain whether the parts could be replaced previously to the attack ; if they could not, and the swelling be hard and old, they are probably adherent, and the impossibility of reduction proves nothing. If they could be returned, and particularly a short time only before the access of the symptoms, strangulation may be suspected with justice ; but it is still not quite certain.”
(LAWRENCE.)

Strangulation consists in pressure upon the protruded parts. As this pressure is generally made by a tendon, it is perhaps improper to use the term *stricture*, and Mr. Lawrence objects to employing it, asserting that the

aperture is generally dilated instead of being contracted. I would beg leave to remark here, however, that the relative size of the ring, or part which makes the compression, and of the compressed parts, is so changed when strangulation takes place that the term stricture may be retained, provided the passive nature of the tendinous aperture be kept in view. A portion of omentum or intestine pushed forcibly through the abdominal ring may become strangulated, or the contents of an old hernial sac may be suddenly increased by the descent of more intestine, or by fæces or flatus, in such a manner as to become strangulated.

The neck of the sac as well as the aperture in the parietes of the abdomen is capable of making constriction upon its contents, in consequence of the thickening and induration which the peritoneum undergoes in some cases of hernia.

Mr. Astly Cooper believes that in some cases of inguinal hernia the stricture is truly spasmodic; he says that "when the strangulation is above the ring, a portion of intestine protrudes under the edge of the internal, oblique, and transversalis muscles, compressing them, which in their turn being excited to contraction by the irritation of this pressure, react upon the intestine with a force sufficient to produce a strangulation accompanied by spasmodic symptoms."

The strangulation in some instances comes on immediately. I have known a patient straining at stool suddenly force down an additional portion of intestine into an old hernial sac; and immediate strangulation was the consequence. In such cases "the symptoms, Mr. Lawrence remarks, come on suddenly, and their progress is rapid; the swelling is tense and highly painful, particularly at the ring, where the slightest pressure is intolerable: the abdomen quickly becomes painful, and is

tense and elastic to the feel. The constitutional affection partakes of the inflammatory character. So quickly does the complaint run through its stages in this case that gangrene has been known to occur in twenty-four hours from the expulsion of the intestine."

In other cases the strangulation is slow and progressive. In some of these cases many days elapse before it is complete. In such cases successful operations have been performed a fortnight, and even three weeks after the commencement of incarceration. This slow strangulation generally happens in large old herniæ which have been often protruded and replaced, or which have been long unreduced. There is generally an unusual heaviness and hardness of the tumour in such cases owing to an increased quantity of the contents of the intestine.

Inflammation sometimes attacks the parts protruded from the abdomen, especially in cases where the tumour is very large. This if possible should be distinguished from strangulation, and although it be difficult to discriminate, yet it may sometimes be done by careful attention. The ring will be found in the present case free from tension, and the parts within it, will not appear compressed. If the ring, however, should become tense, and the protruded bowels painful, the case ought to be treated as if strangulated.

CHAPTER VI.

Treatment of Reducible Hernia.

“ The treatment of a reducible rupture comprehends the return of the protruded parts, and their retention within the abdominal cavity by means of an appropriate truss. The necessary observations concerning the mode of replacing ruptures will be delivered, when the treatment of strangulated hernia is considered.

“ So long as the protruded viscera can be made to pass freely into the abdomen, this complaint carries with it no immediate danger to the patient. It may indeed be troublesome, both from the bulk of the swelling, and from the intestinal derangements, which the residence of the viscera in their unnatural situation is apt to create ; but, independently of these circumstances, it may exist throughout life, without causing more than slight inconvenience. This innocent state of the disorder, cannot, however, be at all depended on ; as numerous accidental causes may at any time bring it into a condition, where the life of the patient is exposed to the greatest risk. A trifling bodily exertion, by forcing down an additional quantity of the bowels, an excess in eating or drinking, an indigestion, or any intestinal disorder, may convert the rupture from a reducible to an incarcerated state. Should the patient escape this fate, the unrestrained increase of the swelling constitutes a sure source of future inconvenience and disease. The vast size to which neglected hernia sometimes increases, not only prohibits all active exertion ; but, by involving in the male, the integuments of the penis, incapacitates the subject from the

act of copulation, and gives rise to excoriation from the discharge of the urine over the swelling. Probably too the testis may be affected by the pressure of a very large scrotal hernia. Disorders of the intestinal functions invariably attend these large ruptures, and increase in frequency and violence, in proportion to the size of the swelling, and age of the patient. All the moveable viscera of the abdomen gradually find their way into the hernial sac, if a rupture be entirely neglected. Numerous instances are recorded, in which the jejunum, ileum, colon, and omentum, have been entirely included. The constant force acts even upon the more fixed parts, and entirely changes their relative positions; thus the stomach is brought into a perpendicular line parallel to the axis of the body; and its pyloric orifice has been actually within the mouth of the sac. It was drawn down to the pubes in the case of Mr. Gibbon.

“These considerations should render every person afflicted with a rupture, anxious to get the parts replaced, and to have a proper truss applied; and they should lead surgeons to inculcate the necessity of these measures, as forcibly as they can on the minds of all such as seek relief from their advice.” (LAWRENCE.)

OF TRUSSES.

The object in applying a truss, is to close the opening by which the viscera protrude, by permanent pressure, and thus when the parts are reduced to prevent their re-descending. The best instrument for this purpose is an elastic spring of steel, so constructed as to make pressure upon the precise spot where the protrusion takes place. When this spot is the abdominal ring, or the crural arch, the truss in common use, provided it fit the patient accurately, is the best instrument hitherto employed.

It consists of a flat narrow piece of steel passing round the body, and adapted to its form; it terminates in a plate of iron which is to be fixed over the place of protrusion. The posterior surface of the plate is furnished with a convex cushion termed the pad, adapted in form and size to the opening which it is designed to close. The spring is covered externally with leather that may sit easily on the body. Its inner surface is lined with some soft substance. A strong strap extending from its posterior end passes round the sound side of the trunk, and is fastened to a hook on the front of the plate. This strap being perforated by several holes enables the patient to tighten or loosen the truss at pleasure.

The curvature of the spring should be accommodated to the breadth of the haunch in each individual, for this varies very considerably. "A piece of cork is fastened to the posterior surface of the iron plate, and this is covered with leather stuffed with hair or wool, so as to give it the due firmness, and to bring it to a slight and uniform convexity." The size of the pad should be rather larger than the opening it is intended to cover.

When the patient is ruptured in both groins he should have a double truss, one spring going quite round the body, and terminating in two pads, one over each aperture.

Should the truss slip upwards, a strap may be passed between the thighs which will prevent it; if downward it can be remedied by a shoulder strap; but this is seldom necessary except in very corpulent persons, and in general if the instrument be properly constructed it maintains the proper position.

"The pad of the truss should be placed over the opening at which the viscera have protruded: hence, in a small, or recently formed inguinal rupture, the proper

position for it is considerably exterior to the pubes, and rather above that bone. The surgeon must, in all cases, endeavour to ascertain the precise point at which the rupture has taken place, and that is the right position for the pad. When he is going to apply the truss, he will place it round the pelvis, and put the patient into the recumbent position. Having carefully replaced the whole protrusion, he presses on the opening with one hand, and with the other applies the pad of the truss in its proper situation, holding it there until he has adjusted the rest of the instrument, and fastened the strap to the plate. The patient will follow the same plan in applying the instrument himself; and the most convenient time for this purpose is before he rises, as the viscera generally re-enter the abdomen during night, and have no disposition to descend again until he assumes the erect position.

“When the bandage is applied, the patient rises, and the surgeon examines it carefully in every point, to see whether the skin is folded, pinched, or too much compressed in any situation. He may walk, cough, and make slight efforts for the purpose of ascertaining whether the parts are well kept up; and if they are not, it must arise from some error in the construction or application of the bandage which will require attention.

“If the viscera are well supported by the instrument, the patient may follow his ordinary occupations: yet he should bear in mind the affected part. Violent exercise or bodily exertion, and excess of eating or drinking should be avoided. The surgeon should examine him in two or three days. If any part has escaped, or if there be swelling or pain in the spermatic cord, some imperfection must exist in the instrument, and must be remedied. The omentum very often escapes, and great difficulty is frequently experienced in keeping it reduced. It may be necessary, if the pad retains its situation on

the ring, and the truss in general sits well, to tighten the strap a little. Some individuals find the pressure of the truss extremely disagreeable at first, although it is no more than the case requires. These may wear a very weak instrument for an hour or two daily, increasing the length of time of such application, until habit has rendered its constant use supportable.

“The use of an elastic truss not only keeps the viscera within the abdominal cavity, and thereby protects the ruptured person from all the dangers to which the existence of his complaint would otherwise expose him; but if continued for a sufficient length of time, even affords a prospect of a radical cure. The constant pressure of the pad keeps the neck of the sac empty, and this part together with the surrounding tendinous opening, contracts, in obedience to the general law, by which all hollow parts of the body adapt themselves to their contents. Sometimes the truss excites a kind of slow inflammation, which produces an actual agglutination of the sides of the aperture.” (LAWRENCE.)

The patient often asks how long he must wear his truss: it is not easy to determine this. In young persons, it should be worn at least two years, and in elderly patients during life.

Mr. Lawrence dissected a patient in whom a very old and extensive rupture had in this manner been radically cured by an adhesion at the neck of the sac. In children there is great reason to expect radical cures in this manner, as many such have been effected.

The truss should be worn constantly and not taken off at night, as is the custom with many patients. When the cure is effected it may be laid aside, but this is a point not easily ascertained. When a person afflicted with hernia is obliged to make any unusual effort, he should forcibly press on the pad of the truss to prevent the ill effects of his exertion.

The degree of pressure necessary, varies in different cases, and is easily regulated by the thickness of the spring. In those cases which require so strong a spring as to produce pain by pressing on the spermatic cord, a hollow space should be left in the pad for that part; this caution is particularly necessary when the testis or cord is in a diseased state.

Mr. Gooch recommends in cases where the spermatic cord is enlarged, to have the pad constructed with a projection in the middle, just sufficient to fill up the abdominal ring.

A truss for umbilical hernia has been constructed by Mr. Marison of Leeds. It is composed of two pieces of thin elastic steel, which nearly meet behind the back; in front they form an oval ring where they are thicker than at any other part. A steel spring and a pad of stuffed leather, are fastened to this ring, in such manner as to press upon the hernia. It is covered with soft leather and is tied with tapes behind.

In the opposite plate are represented the trusses for inguinal, crural, and umbilical herniæ.

CHAPTER VII.

Treatment of Irreducible Hernia.

RUPTURES are very often irreducible when they are not in a state of strangulation. The chief circumstances which prevent their return are an increase of bulk, and preternatural adhesions to surrounding parts. Bands formed of coagulating lymph pass in some cases in various directions through the hernial sac, and water in many cases collects in considerable quantity, rendering it necessary to tap the tumour for its evacuation. I have at this time a patient thus circumstanced ; he has a large scrotal hernia, and every month I draw off from it several pints of water.

Irreducible herniæ must in great measure be left to themselves. The inconveniences arising from the bulk are considerable, and there is constant danger of strangulation. This risk is diminished in many cases by the great dilatation of the ring, but it nevertheless exists, and should render the patient extremely cautious of all violent exertions, and he should especially guard against costiveness. A suspensory bag such as is used in cases of swelled testicle or hydrocele, will be found to obviate some of the unpleasant effects of the tumour.

Cases considered as irreducible hernia have in some instances been gradually returned into the abdomen in consequence of long confinement to bed, and frequent purges, together with an adherence to an abstemious diet. In addition to these remedies, when the patient consents to employ them, moderate and increasing pres-

sure should be made upon the tumour by means of a sac of firm linen made so as to lace up to it in front.

Irreducible herniæ should be carefully protected from accidental injuries, as the most serious consequences have sometimes resulted from blows upon such parts. And it is to be recollected that during the whole time of protrusion there is a risk of strangulation in consequence of any violent exertion.

Patients afflicted with irreducible hernia are liable to indigestion and bowel complaints, from very slight causes, and therefore they ought to be extremely guarded against errors in diet; they should also pay particular attention to prevent costiveness, by the use of clysters or laxative medicines when these become necessary. If, however, strangulation should take place in an irreducible rupture, it will generally be found to arise from an accumulation in the contents of the bowels, and therefore cathartic medicines and clysters very frequently relieve it without much difficulty.

CHAPTER VIII.

Treatment of Strangulated Hernia.

THE great object is, to replace the protruded parts in their natural situation within the abdomen, except in cases where they are probably mortified. The measures employed for this purpose are very various; the principal of which, are, the taxis—bleeding—the warm bath—clysters of tobacco—the application of ice or cold substances to the tumour—opium—and cathartics.

I. OF THE TAXIS.

By this term surgeons express the attempt to reduce a hernia by the hands. The operation consists in varied endeavours to push up the protruded intestines. The patient is generally placed in a recumbent posture. When the case is an inguinal or femoral hernia, the pelvis should be placed higher than the shoulders, and if possible the patient should avoid straining, coughing, and every exertion of the abdominal muscles.

“The position of the patient must also be regulated with a view to the opening, through which the parts have descended. Hence, in inguinal and crural hernia, the thigh should be bent, and rolled inwards, in order to relax the tendon of the external oblique muscle. It is also recommended to elevate the shoulders slightly, as well as the pelvis. This brings the trunk into a curved state, and completely relaxes the abdominal muscles. Since the position now described is the most favourable to the return of the protruded parts, it should be continued, as

nearly as circumstances will admit, until the rupture is replaced.

“When things are thus prepared, the surgeon begins his attempt by a gentle pressure on the tumour, which may be gradually increased, but should not be carried to such an extent as to cause pain: violence cannot indeed be beneficial, as it is more likely to press the parts in a mass against the ring, and thereby bruise and injure them, than to urge them through the opening.

“Numerous instances are recorded, in which this unscientific roughness has produced the most injurious consequences. Suppuration of the omentum, and gangrene or rupture of the intestine, have been its more immediate or remote consequences: and the danger of the subsequent operation must be greatly increased, if the attempts at reduction are ineffectual.

“We usually grasp the tumour with one hand, while the other is placed at the aperture, where it may be employed in facilitating the entrance of the parts, and in keeping up those which have been already returned. Success will often be obtained by exerting a general pressure on the whole surface of the swelling; in which method both hands must be employed, in order to subject the entire tumour to the action of the force. This method is strongly recommended by Petit.

“The pressure should be exerted according to the course in which the parts have been protruded: thus, the contents of a bubonocoele pass obliquely downwards and inwards; those of a femoral rupture downwards and then forwards; yet we should not confine ourselves entirely to such a kind of pressure as the course of the hernia would suggest; but in failure of those attempts, make other trials in different directions.

“The following manœuvre will sometimes succeed in a bubonocoele or scrotal hernia, after the more ordinary methods have failed particularly in cases where the

strangulation seems to have been caused by an accumulation to fecal matter. Let the surgeon embrace the neck of the swelling, close to the tendon, with the finger and thumb of one hand, and carry them down with a moderate pressure, so as to remove the contents from the portion next the ring; this will reduce the size of that part, which he may then attempt to pass into the ring with the other hand. Indeed, since the obstacle exists at the mouth of the sac, reduction will in general be more easily effected by pressing the upper part of the tumour towards the ring, than by exerting a general pressure over the whole swelling.

“The return of a piece of intestine is generally preceded by a peculiar noise, caused by the passage of air through the strictured part. It recedes at first gradually, and then slips up suddenly. The omentum goes up slowly to the very last portion, which must be actually pushed through the opening.

“If the taxis should not succeed at first, it may often be successfully repeated after the use of the warm bath, bleeding, or cold applications.

“The surgeon is not warranted in relying on the taxis as his chief method of accomplishing reduction; he should not waste in unavailing efforts of this kind, that time which ought to be devoted to the prosecution of more vigorous measures. When he cannot reduce a rupture at one fair trial, he has less and less chance of effecting this object in the subsequent progress of the case, unless he can produce an alteration in the state of the tumour by other means.

“Mr. Wilmer, of Coventry, has suggested a plan which should be noticed in this place. He proposes to make pressure by means of a weight left on the part for several hours. It succeeded with him in two cases. A two pound leaden weight was employed in one of these, and a common smoothing iron in the other. If the swelling were

free from pain, and the circumstances not urgent, there could be no objection to a trial of this method.

“After the reduction is accomplished, great care should be taken to avoid all irritation of the bowels, a mild cathartic should be employed to cleanse them.” (LAWRENCE.)

II. OF BLOOD-LETTING.

If the taxis should prove unsuccessful, blood should be drawn from the arm. Surgeons of the greatest respectability differ as to the propriety of this measure. Having never witnessed any ill effects from it, but on the contrary, having frequently seen it successful, I have no hesitation in recommending it. The quantity of blood to be drawn, should be sufficient to produce considerable sensations of weakness, and if possible, a tendency to syncope; to effect which, the stream of blood should be large, and the patient's head should be propt up during the operation.

Mr. Cooper remarks, “that a person unaccustomed to the small thready pulse of a patient suffering under strangulated hernia, feels apprehensive of taking away blood, conceiving the patient's strength to be fast sinking, but this fear is groundless, as the pulse becomes larger after this evacuation.” The cold extremities, pale countenance, and weak respiration, of the patient, are also relieved rather than augmented by the operation. If syncope occur, it affords a favourable opportunity for attempting the reduction by the taxis.

III. THE WARM BATH.

Should the hernia not be reduced by this attempt, the patient is to be placed in a warm bath, the temperature about one hundred degrees, and

should be gradually raised till the patient becomes fainty, at which time the taxis should be again tried.

“The warm bath is used with views partly analagous to those which guide the practitioner in the employment of venesection, it induces a state of faintness and relaxation under which the reduction may be attempted with advantage. The weakness produced by this remedy is temporary, and is not attended by any subsequent debility.”

IV. THE TOBACCO CLYSTER.

The tobacco clyster is the next remedy to be employed; the most convenient mode of preparing it is by infusing a dram of tobacco in a pint of boiling water for ten minutes—one half of which may be injected first and the remainder in twenty or thirty minutes if necessary. The quantity can be still further increased if the remedy prove inefficient, but extreme caution is necessary in the employment of this powerful medicine. Mr. Astly Cooper witnessed the death of a patient to whom two drams had been administered as a clyster. In another case related by the same author, a girl had a single dram injected; “it produced violent pain of the abdomen with vomiting, in which was thrown up a matter which smelt strongly of tobacco, and she died in thirty-five minutes after the clyster had been administered, most evidently from its effects.” Mr. Cooper adds, that “when the tobacco acts in the manner to be desired, it produces extreme languor, a weak and quick pulse, a cold sweat, and such universal relaxation that the patient has not power to exert any of the voluntary muscles of the body. In this state, the hernia will often return into the abdomen with a slight pressure, though it has previously resisted a considerable degree of force.”

V. COLD APPLICATIONS.

The next powerful remedy to be employed is cold. The mode of using it is by applying pounded ice or cold water in bladders to the tumour. Certain salts which in dissolving, occasion great degrees of cold, may be substituted, when ice is not to be procured. A solution of sal ammoniac and nitre in equal parts answers very well; ten ounces of this mixture may be dissolved in sixteen ounces of water. Mr. Wilmer has very strongly recommended the application of cold, and I am happy to state that I have in several cases found it completely successful. In the employment of ice care should be taken not to freeze the skin, an accident which occurred to a patient under the care of Mr. Cline and Mr. Sharp.

VI. OPIUM.

Opium is often beneficial: it allays vomiting, and sometimes appears to be instrumental in effecting the reduction. After passing an hour in fruitless attempts to reduce an inguinal hernia, I gave the patient at midnight a large dose of laudanum, and left him, expecting to perform a surgical operation for his relief in the morning—I found next day to my surprize that the patient had slept soundly, and that during sleep the protruded intestine had returned into the abdomen. A second case somewhat similar has since occurred.

VII. CATHARTICS.

Cathartics are by most surgeons laid aside in the treatment of strangulated ruptures. There are cases, however, in which they appear proper, and these are cases

in which the strangulation takes place slowly, and the bowels appear loaded with fecal matter. Whenever vomiting occurs, medicines taken by the mouth generally increase it and do no harm. The best cathartic I have seen employed is a combination of jalap and cream of tartar. In omental hernia purges are generally useful when the stomach can retain them.

The following remarks of Mr. Lawrence on the employment of the preceding remedies are extremely judicious.

“It may be expected, that these observations on the various modes of treating strangulated hernia should be applied to cases as they actually occur; but this must be done by the surgeon in his practice. He should endeavour to ascertain the cause and species of the incarceration; and he must exert his own judgment in the selection of his means, and their adaptation to the circumstances of the case. If he is called in the early state of the complaint, and the taxis has been unsuccessful, warm bathing and blood-letting, where the circumstances admit of it, will be the first means for him to employ. I should not, however, be inclined to recommend the warm bath, unless it can be prepared expeditiously.

“Cold applications to the tumour hold the next rank in the list of remedies. Should these be unsuccessful, he will give a fair trial, with as little delay as possible, to the tobacco; and, in the event of its failure, immediately operate.

“When as it very frequently happens, the aid of the surgeon is not required until the complaint has lasted for some time, a trial of the tobacco, together with the topical use of cold, should be immediately resorted to; as circumstances will not admit of delay in the previous use of less powerful remedies. His own discernment must be trusted for adapting his means and conduct to

the different circumstances of an inflammatory and a chronic case. The use of purgatives and clysters, which are beneficial in the latter, do not afford a chance of success in the former description. They should never be employed, unless the slow progress of the case clearly shows that the danger is not urgent.

“I wish to impress the surgeon with the propriety of giving, without delay, an adequate trial to the most powerful means which the art affords, and of performing the operation as soon as it can be clearly perceived that these are unsuccessful. There is no reason to expect that a less active remedy will succeed, when a more potent one has failed. The chance of reducing a rupture is lessened in proportion to the duration of the complaint: the prolapsed parts becoming more inflamed, are more closely pressed by the stricture, and soon fall into a state where attempts at reduction by the hand are inadmissible.”

The dangers resulting from delaying the operation too long, have been clearly inculcated by all the late writers on hernia. Mr. Hey's very candid account of his own timidity and its consequences, is a striking comment upon the subject; he says that he lost three patients in five, when he first began business. Having more experience of the urgency of the disease, he made it his custom, when called to a patient, who had laboured two or three days under the disease, to wait only about two hours, that he might try the effect of bleeding, (if that evacuation was not forbidden by some peculiar circumstances of the case) and the tobacco clyster. In this mode of practice he lost about two patients in nine, upon whom he operated. This comparison is drawn from cases nearly similar, leaving out of the account those cases in which gangrene of the intestine had taken place. “I have now,” he adds, “at the time of writing this, performed the operation thirty-five times; and have often had occasion to lament that I performed it

too late, but never that I had performed it too soon." It is unfortunate that no mode of ascertaining, from the symptoms which occur, the proper time for operating has yet been pointed out. It would be very important for the surgeon to ascertain the latest period to which his operation could be postponed. It has been supposed that the occurrence of hiccough denotes the commencement of mortification ; but for this opinion there is no ground, since it often takes place before gangrene comes on, and is often absent when the intestines are mortified. Mr. Cooper says, that he is always anxious to perform the operation before the abdomen becomes sore to the touch :—he does not allude to the tension of the abdomen which occurs soon after strangulation, but to a pain arising from pressure on the belly, which denotes that its contents and lining membrane are inflamed, in which case death generally follows the operation.

A fair trial therefore of the remedies already described, having been made, the operation of liberating the strangulated intestine by the knife should be promptly performed ; the modes of doing it will be described hereafter.

Most of the preceding observations refer to hernia generally.—We proceed next to speak of particular ruptures.

CHAPTER IX.

Of Inguinal Hernia.

INGUINAL HERNIA, and SCROTAL HERNIA, are that species of rupture in which the protruded viscera pass out at the abdominal ring. It is inguinal hernia whilst the tumour is confined to the groin, in which situation it is also called BUBONOCELE; it becomes scrotal hernia when it descends so low as to be covered by the integuments of the scrotum. In women it forms a tumour in one of the labia pudendi.

It is impossible to communicate correct ideas of this disorder to a person unacquainted with the anatomy of the parts affected. Mr. Astly Cooper has bestowed a great deal of labour in investigating and describing the important structure of the abdominal ring, and the parts in its vicinity; he has illustrated his descriptions by very accurate and very splendid engravings, taken from actual dissections, and in this manner has laid before the public one of the most useful and instructive volumes of which modern surgery can boast.*

To Mr. Cooper's book, and to the dissecting room I refer for the anatomy of these parts, contenting myself with one or two remarks. The aperture through which the parts descend in this species of hernia, is not to be considered as a ring, or hole, but as a passage or canal, the internal extremity of which, is the part where the spermatic vessels leave the abdomen, which is generally

* Engravings have also been published by Sæmmering from drawings by Camper, and more recently by Scarpa, illustrative of the anatomy of hernia which have great merit.

one inch and a quarter distant from the abdominal ring, the inner margin of the opening being almost invariably half way between the spinous process of the ilium and the symphysis pubis ; through this opening and through the abdominal ring, the spermatic cord passes down in the male subject to the testis.

The following description of the complaint is extracted from Mr. Cooper's treatise.

Inguinal hernia makes its first appearance in the form of a small tumour, situated about an inch and a half to the outer side of the abdominal ring, in a line extending from the pubis to the anterior superior spinous process of the ilium.

If its progress is interrupted, it proceeds gradually obliquely downwards, and inwards, in the direction of the spermatic cord as far as the abdominal ring.

As long as it remains above the ring its existence is often unsuspected by the patient, because it requires a careful examination to detect it ; but to a surgeon acquainted with the natural feel and appearance of the parts it is sufficiently obvious. The length of the swelling above the ring will be found the same as the part of the spermatic cord included between the upper opening and the abdominal ring ; that is, about an inch and a half in the adult subject.

The tumour next descends through the abdominal ring into the scrotum (here taking the name of scrotal hernia,) and being now less confined than before, it forms a distinct swelling, sufficient to awake the patient's attention, who now, generally for the first time, is led to require surgical assistance. As the growth of the tumour, when in the scrotum, is little restrained by external pressure, it increases to an almost unlimited, and sometimes enormous size. One of the largest of these swellings which is recorded, occurred in a man who was sent to Guy's Hospital by Mr. White, surgeon at Lambeth. It reached to the patient's knees, its length

was twenty-two inches, and its circumference thirty-two. Another measurement taken by Mr. White when it had been for some hours strangulated, gave thirty-four inches for the circumference, and twenty-two for the length.

When an inguinal hernia is dissected, immediately under the skin of the scrotum is found a fascia of greater or less thickness according to the duration and size of the tumour. This fascia is given off by the tendon of the external oblique muscle above the abdominal ring. In general, it appears little more than a condensed cellular membrane, but in old herniæ it becomes as dense as the fascia that covers the muscles on the outer part of the thigh.

Under this fascia is the cremaster muscle, which forms another covering to the hernial sac; for this muscle, in passing down through the abdominal ring, is united both to the fascia and to the sac, separable from both, however, by an easy dissection. This muscle becomes much more extended and thicker in hernia, than in the natural state.

When the fascia and cremaster muscle are removed, the proper hernial sac becomes exposed to view. This is thinner than the two former coverings, but somewhat thicker than the peritoneum from which it is immediately derived. Many writers have represented the sac as much denser than it really is, mistaking the two above coverings for the sac itself.

Behind the hernial sac lie the spermatic cord on the upper part, and the testicle on the lower; so that the sac is situated between the cord and the cremaster muscle, anterior to the former and posterior to the latter. The direction of the hernia above the abdominal ring is obliquely upwards and outwards towards the spine of the ilium, the same as that of the spermatic cord. Above the ring, the hernial sac is covered by the tendon of the external oblique muscle; the spermatic cord is still be-

hind it, and further backwards are the tendons of the internal oblique and transversalis muscles and the fascia before mentioned. At the upper aperture in the fascia, the sac penetrates the abdomen along with the spermatic cord. This part is called its mouth, and is generally, though not always, its narrowest dimension. Between the mouth of the sac and the symphysis pubis passes the epigastric artery. This vessel runs in some degree under the sac, and along its inner side. There is no vessel of importance above the mouth of the sac, nor externally, that is, between it and the spinous process of the ilium.

The relative situation of the hernia with the abdominal openings above described, applies only whilst it remains of small size; for when hernia has existed a considerable length of time, and has carried with it a large portion of abdominal viscera, the constant pressure dilates the parts in each direction, extending the opening through which it passes from the abdomen, both towards the spine of the ilium, and especially towards the symphysis pubis. Hence it is, that in old and large hernia, the orifice of the sac into the abdomen is brought to be almost in contact with, and opposite to, the abdominal ring.

It has been stated that the hernial sac in its descent is anterior to the spermatic cord. This is its most frequent situation, but varieties occur in this respect which the surgeon should keep in mind during the operation, and the cord is sometimes found separated, and the hernial sac protruded between its vessels.

The inguinal hernia is very generally pyriform, small towards the ring, and enlarging as it descends. It occurs much more frequently on the right than the left side.

The circumstances whereby this disease may be dis-

tinguished from other tumours with which it is liable to be confounded, are the following :

First, When the patient is desired to cough, the tumour becomes immediately distended, owing to the pressure of the abdominal muscles forcing down into the sac more of the viscera or their contents.

Secondly, When the patient can state from his remembrance, that on the first appearance of the tumour in the groin, it had used to return into the abdomen when he was in a horizontal posture, and to re-appear on standing erect ; though circumstances may have long prevented this symptom from continuing.

Thirdly, When the progress and the tumour has been from the groin gradually downwards to the scrotum.

Fourthly, When the tumour contains intestine, it is elastic and uniform to the touch ; and on being pushed up into the abdomen, it returns with a gurgling noise. But when omentum is contained, the tumour is less equal on its surface, receives an impression from the fingers, is heavier than in the former case, and does not make the same noise when returned into the abdomen. Most commonly, however, both intestine and omentum are the contents of the hernia ; a circumstance which impairs the accuracy of any very nice distinctions by the touch ; though still on pushing back the contents of the tumour, the presence of intestine, which returns the first, will often be indicated by the gurgling noise, whilst the more solid omentum may be felt going up after it.

Lastly, The functions of the viscera are somewhat interrupted. Eructations, sickness, constipation, colicky pains, and distention of the abdomen occur ; and pain is produced by violent exertions, coughing, or sneezing. These are the symptoms that generally give the patient some suspicion of the nature of the complaint.

However there are several diseases of the groin and scrotum with which hernia is liable to be confounded ;

so that there are few surgeons who have seen much of hernia, who have not frequently witnessed mistakes, made even by medical practitioners, which have led to the application of trusses in diseases where they not only are useless, but even productive of much injury. The reputation of the surgeon, and the safety of his patients, require of him a very accurate attention to this point.

A hydrocele of the tunica vaginalis testis resembles hernia in its form, but may be distinguished from it by the following marks :

The hydrocele begins to form at the lower part of the scrotum, and gradually extends towards the ring. It also involves the spermatic cord and testis, so as to render them with difficulty distinguished by the touch; whilst in hernia they may in general be felt with ease behind the tumour. Hydrocele gives a fluctuating feel when struck with the fingers, does not become dilated when the patient coughs, and appears considerably transparent when a lighted candle is held by its side.

There are cases of hydrocele, however, in which there is unusual difficulty in deciding upon the nature of the complaint. When it becomes so large as to extend upwards through the abdominal ring to the abdomen, the form of the tumour is precisely the same as that of hernia, and it even dilates when the patient coughs, owing to the sudden pressure upon that part of it which lies above the ring. The transparency, the fluctuating feel, and the observed progress of the swelling from below upwards, are then the only distinguishing marks.

A tumour sometimes appears in the scrotum, which descends in the erect posture, returns when the body is recumbent, distends upon coughing, fluctuates, and is transparent. This disease is a collection of water which runs backwards and forwards from the cavity of the abdomen within the tunica vaginalis, owing to the opening of this membranous sheath never having been closed.

When this disease is complicated with ascites, it becomes distended to an enormous size. It is readily distinguished from hernia from its transparency, which may always be observed.

Water sometimes collects in a cyst upon the spermatic cord, forming a hydrocele of the cord. When it is placed entirely below the ring, its want of connexion with the abdomen readily distinguishes it from hernia; but when it passes within the ring to the abdomen, some difficulty occurs in understanding its nature. If from its situation the transparency cannot be examined, and if the fluctuation is not very distinct, a surgeon should be very cautious in operating on such a tumour.

Nothing but great want of attention can cause a hernia to be confounded with an enlargement of the testis. This latter is sufficiently distinguishable by the form of the organ, which is retained under morbid enlargement, by its weight, by the pain with which it is generally accompanied, and by that peculiar and intolerable sensation always produced by pressure upon this part.

Hematocele, or a collection of blood in the tunica vaginalis testis, as it generally arises from a blow, is of the same form as hernia, and liable to be confounded with it. But the firmness of hematocele, the redness of the skin with which it is accompanied, its refusing to dilate under coughing, and freedom from swelling of the spermatic cord at the abdominal ring, which is generally the case, will usually afford the means of distinction from hernia.

But of all the diseases of the scrotum, which are mistaken for hernia, none is so much so as the varicocele* or enlargement of the spermatic veins. Mr. Cooper has known persons (even the children of medical men) to wear trusses for a supposed hernia, which they complained did not fit, gave them pain, and could not prevent the

* By varicocele Mr. Cooper means the disease more properly denominated circocele.

descent of the tumour, when it was found that the disease was this enlargement of the spermatic veins.

Varicocele has indeed many of the marks of hernia. When large it dilates upon coughing, but not otherwise; it appears in the erect position, and retires when the body is recumbent; and it is first observed near the ring. The only sure method of distinction according to Mr. Cooper is to place the patient in the horizontal posture, and empty the swelling by pressure upon the scrotum, then putting the fingers firmly upon the upper part of the abdominal ring, desire the patient to rise: if it is a hernia, the tumour cannot re-appear as long as the pressure is continued at the ring; but if a varicocele, the swelling returns with increased size, owing to the return of blood into the abdomen being prevented by the pressure.

Some judgment may also be formed by the feel of the tumour, for that of varicocele is always ropy, as if a bundle of cords were contained within the scrotum.

There are, however, some cases of a complicated nature which demand much judgment and accurate discrimination. For instance, hernia is sometimes complicated with hydrocele of the tunica vaginalis; and sometimes the sac contains omentum, adhering to its upper part, and a collection of water below. If the adhesion of the omentum is complete, there is no danger of attempting the cure of the hydrocele by injection; however, if the case clearly appears to be of this kind before operation, it is best to use the method of incision.

OPERATION FOR INGUINAL HERNIA.

Having already described the means to be employed for the reduction of inguinal hernia, it remains to describe the operations which become necessary, when the strangulated parts cannot by these measures be returned.

The object of a surgical operation in the present case is to replace the protruded bowels, if they be not gangrenous, and to remove such portions as may be mortified.

The patient should be placed upon a common dining table, with his legs hanging over its end, his shoulders and knees being a little raised by pillows in order to relax the abdominal muscles. The bladder should be emptied.

The hair being removed from the pubes, an incision should be made with a common scalpel through the skin and cellular membrane, beginning an inch from the abdominal ring, in the direction of the fibres of the external oblique muscle, and extending nearly, or in small herniæ, quite to the bottom of the tumour. The external pudental artery is generally divided by this incision, but seldom requires a ligature; if it bleed so as to incommode the surgeon, an assistant may compress it with his finger, or if necessary, the surgeon can take it up with a tenaculum and ligature.

If the operation be performed in a case in which it would be desirable to return the parts, if practicable, by the taxis; that is to say, if no symptoms of gangrene be present, then the operation should be conducted in the following manner: the abdominal ring, and the portion of the tendon forming it, should be exposed; a small hole should be scratched through the tendon half an inch from the ring, in a direction upwards and outwards, towards the spine of the ilium; a director should be passed through this hole under the tendon and out at the ring; when this is done, a bistoury or scalpel should be passed along the groove of the director so as to divide the tendon. If the stricture have been caused by the abdominal ring, it will in this manner be removed, and the protruded parts can be easily returned into the abdomen. If the stricture be seated higher up than the ring, and the parts can be pushed up without violence by the finger,

it ought now to be done, *without opening the sac*. This very simple and easy operation has in a variety of cases, in Dr. Physick's practice, succeeded completely in effecting a cure; the after treatment is very simple, and the patient experiences very little inconvenience, as the wound speedily heals, and no danger of peritoneal inflammation follows.

This practice of not opening the sac is ascribed by Mr. Lawrence to Petit. Mr. Lawrence thinks it ought to be employed more frequently than it is, and Dr. Monro's testimony is also in its favour; having seen it almost uniformly successful I have no hesitation in recommending it; I am aware of the objections which have been urged against it, but I rest its defence upon the question, whether it would have been proper, before commencing the operation to have returned by the taxis the prolapsed parts? If so, it cannot be more necessary to expose the contents of the sac, after the stricture has been divided. If after reducing the hernia, the sac can also be returned into the abdomen (which is but seldom practicable) this ought to be done.

It is extremely important, however, to bear in mind the necessity of opening the sac, in all cases where there is any reason to apprehend gangrene in its contents, or adhesions which will prevent their reduction.

Mr. Astly Cooper directs the external fascia which proceeds from the tendon of the external oblique muscle to be exposed by a free incision through the skin and cellular membrane; this fascia forms the thickest covering of the sac; the middle of it is to be next cut through and a director introduced beneath it, upon which it is to be divided, upwards towards the abdominal ring, and downwards to the bottom of the tumour. This opening through the fascia exposes the second covering of the hernial sac, viz. the cremaster muscle which must be divided precisely in the same manner, when the sac

will be exposed. "It should be remarked that to those not accurately acquainted with the anatomy of the parts, the division of these layers causes great embarrassment and delay, for the operator expecting to see the sac itself as soon as he has divided the common integuments, cuts the fascia with extreme caution, fibre after fibre, from fear of injuring the intestine beneath, mistaking this thickened covering and the cremaster muscle for the hernial sac.

"When the sac is completely exposed, if the hernia is intestinal, and the intestine does not adhere to the sac, a sense of fluctuation may generally be perceived at its anterior and inferior part, when the tumour is grasped, and the fluid which it contains is pressed forward.

"The surgeon is next to pinch up some of the cellular membrane which closely adheres to the anterior and inferior part of the sac, by means of a pair of dissecting forceps, and when the sac is thus raised, and separated from the intestine, he is to place the edge of the knife horizontally, and to cut a small hole just sufficiently large to admit the blunt end of a probe or that of a director, upon which the sac is to be further divided, being cut upwards to within an inch of the abdominal ring, and downwards to the bottom of the sac. The reason that the anterior and inferior part of the sac is selected for the first incision into it is, that the intestine seldom descends so low, and if it does, the fluid which it contains is generally found interposed between the intestine and that part of the sac. The sac should not be divided higher than to an inch below the abdominal ring, as its division near the abdomen makes it more difficult to close the wound, and exposes the patient to the danger of peritoneal inflammation.

"As soon as the sac is opened, a quantity of fluid escapes; its colour, if the strangulation has not been long continued, is that of serum, but if the intestine has been

for a long time compressed, it becomes of a coffee colour, and sometimes offensive to the smell. Its quantity, if there is no adhesion of the intestine to the sac, is proportioned to the quantity of intestine strangulated, for if adhesion exists, little, if any is found, so that the surgeon who depends on meeting with it, would wound the intestine in the operation. In the omental hernia also there is seldom any fluid in the sac, and if any, a comparatively small quantity; for this fluid seems to be principally a secretion from the surface of the intestine.

“When the sac is opened, the contents of the hernia appear; and if both the intestine and omentum have descended, the latter is the first that presents, and generally covers, and sometimes entirely envelopes the intestine. The omentum retains much of its usual appearance, its colour being only a shade darker than natural; but the intestine is covered with a coat of coagulable lymph, and appears red if it has not been long strangulated; but of a chocolate brown colour if the stricture has been very tight, or the strangulation long continued. The veins upon it are turgid with blood, and I have seen the lacteals upon the jejunum and ileum distended with air.

“The next part of the operation is the division of the stricture, and the surgeon carries his finger into the hernial sac to examine accurately into its situation, which he will find in one or other of the three following parts.

“First, at the abdominal ring.

“Secondly, above the ring from one inch and a half to two inches, and inclining outwards toward the spinous process of the ilium.

“Thirdly, in the mouth of the hernial sac.

“If the stricture is owing to the pressure of the columns of the tendon which form the abdominal ring, it is then to be divided in the following manner. The surgeon passes his finger into the sac as far as the stricture,

and then conveys a probe-pointed bistoury on the fore part of the sac, and to an extent proportioned to the size of the tumour. The dilatation of the ring should not be larger than is sufficient to return the protruded parts; but it should allow them to pass without committing any violence by the pressure exerted in effecting a return. In general, if the finger can be readily admitted into the abdomen, by the side of the protruded parts, the dilatation is sufficiently free.

“It is best to divide the stricture by passing the knife between the ring and the sac, as a larger portion of peritoneum is thus left uncut, and the cavity of the abdomen is afterwards more easily closed. The direction given to the knife in dilating the stricture has been usually upwards and outwards towards the spine of the ilium, but I prefer doing it directly upwards, for the two following reasons.

“First, as the higher aperture must only be dilated directly upwards, it is better that the surgeon should have one general rule for the use of the probe-pointed bistoury, applicable to every case of inguinal hernia, than to be perplexed in the operation by a variety of directions, which only partially apply to one or other seat of the stricture; and secondly, the division of the tendon in this direction weakens the abdomen less than upwards and outwards, because as the cord passes towards the abdomen in that direction, and the hernial sac is parallel with the cord, a dilatation in that course takes off the resistance which the tendon would otherwise make to any future descent. When the ring is divided directly upwards, the upper column of the tendon which forms it is cut, when it is dilated upwards and outwards, the transverse fibres uniting the columns, are divided. The dilatation upwards is equally safe with the other, for if this were not the case, no subordinate advantage ought to interfere with the most important one of security.

“A frequent situation of the stricture, however, is not at the abdominal ring, but at the place at which the sac opens into the abdomen, that is an inch and a half or two inches above, and to the outer side of the ring; and it is there occasioned by the pressure of the tendon of the transversalis which passes over it, and by the resistance of the border of fascia which passes under it.

“If the stricture is at this orifice it is to be divided as follows: The surgeon passes his finger up the sac, and through the abdominal ring, until he meets with the stricture; he then introduces the probe-pointed bistoury with its flat side towards the finger, but anterior to the sac, and between it and the abdominal ring, his finger being still a director to the knife. Thus he carries the knife along the fore part of the sac until he insinuates it under the stricture formed by the lower edge of the transversalis, and internal oblique muscles, and then turning the edge of the knife forwards, by a gentle motion of its handle he divides the stricture, sufficiently to allow the finger to slip into the abdomen: the knife is then to be withdrawn with its flat side towards the finger as it was introduced, to prevent any unnecessary injury of the parts. The direction in which this orifice is divided is straight upwards, opposite the middle of the mouth of the sac, as in this way the epigastric artery can scarcely be cut, whatever be its relative situation with respect to the sac.

“An advantage is derived from dilating the stricture, without cutting the sac itself, for there is danger of injuring the intestine with the naked edge of the knife, which I have twice known to happen when the stricture was divided from within the sac; in one case the patient died from the contents of the intestine escaping into the cavity of the abdomen. In the other the intestine was obliged to be retained in the sac, to allow of the escape of the fæces by the external wound. An additional ad-

vantage is derived from this mode of dilatation, viz. that if by any mistake of the operator the epigastric artery is cut, as the peritoneum is undivided, the flow of blood would be immediately perceived, and then the vessel might be secured ; whereas if the sac is included in the incision, the artery would bleed into the abdomen and the consequences would be fatal, without the cause being known but by dissection.

“The third seat of stricture is the hernial sac itself, from its becoming thickened or contracted ; but I have already said that it is not so frequent an occurrence as has been imagined, for the pressure of the surrounding parts above the ring has been often mistaken for it. It is however undoubtedly true, that it does sometimes occur.”
(COOPER.)

Mr. Cooper adds, “that he had lately dissected a subject, in which the peritoneum at the mouth of the sac was considerably thickened, and had pressed upon a portion of intestine which it included, so as to occasion its strangulation.”

I have myself seen a very singular case in which the stricture existed at the neck of the hernial sac :—A waggoner who had a long time been afflicted with a scrotal hernia for which he had worn a truss, was attacked suddenly with symptoms of strangulated rupture. I visited him and found a small hernial tumour, but so free was it from all appearance of strangulation, that I doubted very much whether his symptoms were at all connected with it—the abdominal ring was an inch in diameter, and admitted freely the fingers to pass up, and the tumour could be pressed up, but immediately after returned. Suspecting a stricture at the upper aperture of the canal, I requested a consultation, and Dr. Physick was sent for ; all the usual remedies for the reduction of the hernia had been tried before I saw the patient, by a medical gentleman who had previously been called in.

Dr. Physick recommended that the hernial tumour should be opened, in order to ascertain whether it contained a strangulated intestine or not. This operation was performed, and upon cutting into the sac some dark coloured fluid escaped, but nothing else could be discovered in it. The finger apparently entered the cavity of the abdomen, but touched nothing but the peritoneum; at length the extremity of my middle finger came in contact with a piece of intestine, near the fundus of the bladder, and this appeared fixed in its situation: I succeeded however in pushing against it somewhat firmly, and it slipped up evidently out of a narrow aperture.

The patient died a few hours after the operation, and upon dissection the nature of this obscure case became evident. An old hernial sac existed, which had been reduced and was now almost entirely within the abdomen, a small process of it only extending through the abdominal ring. Into this hernial sac, a piece of the ileum had been forced, became strangulated, and was found mortified.*

When the stricture is formed in this way by the neck of the sac, in whatever situation that may be, it should be divided by a careful use of a bistoury having only a small cutting surface near its extremity.† Such an instrument has been recommended by Mr. Cooper, but a good substitute may be made by covering a common probe-pointed bistoury with waxed linen, except at its extremity, where a quarier of an inch of the edge may be left bare.

“When the stricture has been completely removed, the protruded intestine is to be attentively examined to observe whether the brown colour which it assumes under

* Several cases are recorded somewhat analagous to this; Mr. Cooper's sixth case of crural hernia in some respects resembled it, but in no case I have seen described, was there a stricture in the neck of an old hernial sac which had been a long time returned into the abdomen. The annexed sketch represents the case I have described.

† Mr. Cooper's bistoury is represented in the first plate of this volume.

strangulation lessens or disappears, as this is a proof of the return of circulation in the part. The veins on its surface may also be emptied by pressure, and their sudden filling noted, and the intestine should be pulled down a little to make these observations on the part which has immediately been compressed by the stricture. If the intestine appears to have a free circulation the surgeon should directly but gradually return it, thrusting up about an inch at a time, and securing each part with his fingers until the whole is returned into the abdomen. All violence and improper haste should be carefully guarded against; for the intestine is tender, and will easily tear at the strictured part.” (COOPER.)

If any difficulty is experienced in replacing the intestine, the position of the patient should be the same as when the taxis is employed so as to relax the aperture into the abdomen.

“If the intestine is connected with the sac by adhesion, an extraordinary degree of caution is required on opening the sac, as it contains no interposed fluids. If the bands which form the adhesion are long enough to allow of the intestine being drawn a little from the sac, they may be completely separated by dissection; but if they are so short that the intestine and sac are agglutinated together, it becomes necessary to cut off portions of the sac, and to return them still adhering to the bowel, into the cavity of the abdomen. Sometimes the adhesion exists only at the orifice of the sac, all the lower part being perfectly free; a circumstance which requires great caution in the operation to ensure the entire return of the protruded intestine, as otherwise the operation will fail of its object.

“It sometimes happens that the convolution of intestine in the hernial sac has its sides glued together by recent adhesions. When this happens, it is right to separate them before the intestine is returned, because the

stools do not readily find their way through an intestine which is thus doubled.

“It is an operation of extreme difficulty and delicacy to divide adhesions at the mouth of the hernial sac. It requires that the sac should be dilated to its mouth, and that the tendon of the external oblique should be slit up to the part at which the hernia descends from the abdomen. Great danger of wounding the intestine, even when the parts are thus completely exposed, attends the division of the adhesions.

“When the intestine has been returned, the omentum is to be examined with attention, and if it is in a healthy state, and not of very considerable bulk, it should be returned into the cavity of the abdomen by as slight a pressure as possible. But if it is very bulky, a part of it should be removed; which may be done by the knife with great freedom, and if properly managed, without any danger. I have myself removed it in several instances without the patient seeming to suffer any subsequent inconvenience. The surgeon raising the omentum, whilst an assistant grasps it higher up to prevent its return into the abdomen, cuts it off near the mouth of the sac. Some small arteries always bleed, which are to be secured by a fine ligature; and when the hemorrhage is stopped, the omentum is to be returned into the abdomen, with its divided surface applied to the mouth of the sac, from which the ligatures are suspended, and it thus forms a plug that shuts up its cavity.

“The practice of applying a ligature round the whole of the protruded omentum, to make it slough away, though it has had its advocates, is now very generally laid aside. Indeed it appears extraordinary that it should ever have prevailed. The very object for hernia, is to take off from the omentum the stricture derived from the pressure of a surrounding tendon, which acts as a cord upon the part; and no sooner is this removed, than the surgeon

applies a ligature, which produces a more perfect constriction than that which had previously existed. I have several times known the omentum tied, and the patient still recover; but it appeared to me that its living powers had been already destroyed by the pressure of the stricture; and if the part is mortified, a ligature cannot excite constitutional irritation, or produce any dangerous consequences, but, on the other hand, its application is attended with no utility, as the omentum would have sloughed if the thread had not been used.

“If mortification has taken place in the omentum, it is to be removed by excision at the sound part, in the manner I have already described. Even if there is only suspicion, and not positive certainty of the omentum being mortified, it should be cut away; as the removal is so far as I have seen, unattended with danger; and its return into the abdomen, if mortified, or even approaching to, that state, is attended with the utmost hazard, and generally proves fatal. One exception, however, to this opinion, I have seen. A man underwent the operation for hernia in Guy’s Hospital, and the sac was found to contain both omentum and intestine, which as they appeared not mortified, although considerably changed, were returned into the abdomen. On the sixth day after the operation the man appeared to be dying, his pulse was extremely feeble, and he complained of severe pain in the abdomen. The ligatures upon the scrotum were cut away, fomentations and poultices were applied to the wound, and on the following day a small portion of omentum protruded in a gangrenous state. More of it continued to come down, in this state, from time to time, during seven days, after which the whole portion which had been originally contained in the hernial sac, appeared in the wound, and gradually sloughed off. The wound then healed, and the patient recovered. This favourable termination could only have happened in a case

in which the mouth of the hernial sac was wide, and where the omentum was lying in the abdomen just opposite to its orifice.

“ If the omentum adheres to the sac, the adhesions may be cut through with considerable freedom, and the bleeding vessels being secured, the omentum should then be returned into the cavity of the abdomen.

“ It is sometimes necessary to cut away the omentum on account of its being in a scirrhus state. A case of this kind occurred in a man who was operated upon for a hernia congenita; and the omentum being thus diseased, formed a large and hard tumour; which is preserved in the Anatomical Museum at St. Thomas’s Hospital.” (COOPER.)

In some cases in which the colon is prolapsed, the appendices epiploicæ protrude in a diseased state, in these cases they should be cut off; no danger attends the operation.

CHAPTER X.

Of Mortified Intestine.

MANY of the following observations on mortified intestine are extracted from Mr. Cooper.

The symptoms by which this state of the intestine is known are, that the tumour which was tense and elastic becomes soft and doughy, and air can be felt crackling in the cellular membrane; that its colour which was at first of a florid red, becomes purple. The hiccough and tension of the abdomen still continue, but the vomiting is less frequent. The pulse is intermittent, but fuller and softer than during the inflammatory state; the eyes are glassy. The hernia now sometimes returns into the cavity of the abdomen without assistance, and the patient survives but a few hours: but sometimes the skin over the tumour sloughs, the intestine gives way, and the fæces being discharged at the opening, the symptoms of strangulation soon after cease. When this happens, the intestine contracts adhesions to the hernial sac. The portion which has been mortified sloughs away, and an artificial anus becomes established, through which generally during the remaining part of the patient's miserable existence, the fæces are constantly discharged. However, it sometimes happens, when the intestine has sloughed, that a re-union takes place of its extremities, the external wound gradually heals, the artificial anus is closed, and the fæces resume their natural course.

The degree of danger which attends the artificial anus, depends upon the vicinity of the sphacelated intestine to the stomach, for if the opening is in the jejunum, so little space is left for the absorption of the chyle, that the patient dies from inanition.

When the artificial anus is in the ileum, it is attended with less danger than in the jejunum. If it is situated in the large intestines, patients scarcely appear to suffer in their general health, for Mr. Cooper has seen several instances of this disease in the colon, all of them in women, and from umbilical or ventral hernia; and they seemed to possess the same bodily health with others, some of them being afterwards extremely corpulent.

With respect to the treatment which is required in these cases of sloughing hernia, very little more can be done than to quicken the process of separation by fomentation and poultice, and to support the strength by cordial medicines and bark: and any attempt made to lead the fæces into their natural course, prior to the sloughing being completed, will only irritate the parts, prevent the regular progress of separation, and endanger the destruction of the patient. When the artificial anus is completely established, all that can be done is to lessen as much as possible the offensive state of the patient, by confining the fæces until it is convenient to discharge them. For this purpose a square cushion, covered with oiled silk, is to be placed over the artificial anus, and a steel truss, which exerts but a slight degree of pressure, being placed upon it, confines the fæces so as to lessen the offensive smell, and allows the patient to seek a convenient situation for an evacuation. This plan answers extremely well if the fæculent matter has some consistence, but if the aperture is in the ileum, the contents of this intestine are with difficulty confined.

In performing the operation for strangulated hernia, if the intestine is mortified, the appearance which it assumes is that of a dark purple, or leaden coloured spot, or spots, which readily break down under the impres-

sion of the finger. The other part of the intestine is of a chocolate brown colour, which has been often mistaken for mortification, but its colour and firmness prove that it has not advanced to that state. Every part of the surface of the intestine is covered by a layer of coagulated lymph, of a brown colour.*

As the intestine cannot, when mortified, be returned into the cavity of the abdomen, the surgeon is to consider in what manner he is to proceed to save the patient from that most miserable state of existence, which is produced by an artificial anus. In forming his judgment upon this subject, he will be directed by the state in which the part is found.

If a small hole only has been produced, the intestine should be returned into the abdomen, excepting that portion of its cylinder in which the hole exists. A needle and ligature should be passed through the mesentery at right angles with the intestine, to prevent its including the branches of the mesenteric artery which supply that part of the intestine, and then through the mouth of the hernial sac; and tying the thread, the intestine becomes confined to the mouth of the sac, and the fæces pass readily from the opening by the wound, but will in part take their course by the rectum. As granulations arise, and the wound becomes closed, the opening in the intestine is gradually shut, and an artificial anus is effectually prevented.

When the whole cylinder of the intestine is mortified, it is necessary to proceed very differently. Then the mortified part of the intestine should be cut away, and the ends are to be brought in contact and confined by means of four ligatures.”

* One of the best tests of the mortification of a portion of intestine is the coagulation of blood in its vessels; this is ascertained by pressure with the finger: if the colour disappears, and returns when the pressure is removed, it is not mortified, otherwise it most probably is.

From a number of experiments performed by Mr. A. Cooper and Mr. Thomson of Edinburgh, and by Dr. Smith in this city, it appears, that when the intestines of animals are stitched in this manner, the ligature passes through the alimentary canal with the fæces,* and the intestine heals very completely. Mr. Cooper infers, that the proper practice when an intestine is divided by mortification, is to cut off its mortified extremities, and “then to pass four stitches through them, one at the mesentery and the three others at equal distances round the intestine; then returning it to the mouth of the hernial sac, which should be opened higher up than usual, it must be there firmly confined by a ligature, being passed through the mesentery in the manner already directed. If stools pass the ligature and the patient goes on well, the ligatures may remain until they are thrown off by ulceration; but if there are no stools, and the patient suffers from a distended abdomen, three of the stitches should be cut away, leaving that which attaches the intestine to the hernial sac, as well as that which joins its edges at the mesentery. The fæces can then readily escape at the external wound; and as granulations arise and the wound heals, the mouths of the divided intestine will become united, so that the fæces will take their natural course.” (COOPER.)

The proposal of Mr. Ramdohr to put the upper extremity of the intestine into the lower, and to confine it there by a ligature, is objected to by Mr. Cooper, who found it impossible to effect it in brutes, and infers its impracticability in the human subject.

When a slough forms on one side of the intestine, so as to destroy half the cylinder, the wound generally heals, so as to form an artificial anus. When the intes-

* The manner in which the ligature is prevented from escaping into the cavity of the abdomen, has been briefly noticed in the chapter on wounds of the abdomen, in vol. i.

tine heals in such a case, its cavity is not sufficient to transmit the fæces, and abscesses form, by which they are discharged. If the wound in the integuments is small, and the intestine has more than half its cylinder, it would be naturally supposed easy to unite it; and cases of success are related, but in the instances in which Mr. Cooper knew it attempted, it has not been attended with success.

“As it appears, therefore, that there is little probability of relief to the patient when this state is once established, the surgeon should attempt, by all the means in his power, to prevent its occurrence.

“The means which will occur to the mind as being most likely to effect this object, will probably be to make an uninterrupted suture upon the opening in the intestine; but this treatment would leave the intestine with only half its cylinder, the fæces will not pass, they will either soon burst the stitches from the wound, or it will become necessary for the surgeon to cut them to unload the intestine, and prevent the death of his patient.

“There is a curious difference in the facility with which a longitudinal and transverse wound of the intestine unite. It has been already shown, that the transverse heal readily; but with respect to the longitudinal, they have a contrary tendency.”

From some experiments performed in this city by Dr. T. Smith of St. Croix, it appears that the intestines of dogs readily recover from extensive longitudinal wounds, though more attention to prevent the escape of their contents is necessary.

In every case where the intestinal canal is partially destroyed by mortification it is best to cut out the whole cylinder at the mortified part, and not to attempt to treat it as a longitudinal wound by cutting out only the portion actually gangrenous.

After the operation for hernia, it is necessary to close

the edges of the wound by adhesive plaster, or if necessary from its extent or from a difficulty of retaining them without it, by an interrupted suture. The patient should remain at rest on his back during the cure, avoiding all efforts of the abdominal muscles, and every thing likely to occasion peritoneal inflammation. In general, the bowels evacuate themselves within a few hours after the operation ; if not, a mild injection may be given.

In very large herniæ, especially in those where there is reason to expect adhesions of the sac and its contents, Mr. Cooper advises simply to dilate the stricture without exposing the cavity of the sac.

Herniæ are sometimes strangulated when they are so small as not to protrude externally at the abdominal ring, the stricture being situated at the inner opening of the inguinal canal i. e. "the aperture at which the spermatic cord first quits the abdomen." This is not easily detected, and has been found on dissection, in cases where no such thing has been suspected. A fulness is generally to be felt just above the abdominal ring, and when strangulation takes place great pain and soreness are perceived at the part.

Mr. Cooper directs in these cases the operation to be performed in the following manner. "The incision is to be begun over the tumour half way between the symphysis pubis and the spinous process of the ilium, and extended downwards parallel to Poupart's ligament, as low as the abdominal ring. This incision, which only divides the integuments, exposes the tendon of the external oblique muscle, which being next cut through in the same direction, without cutting the abdominal ring, the hernial sac comes in view, extending from the abdominal ring to the opening at which the spermatic cord quits the abdomen. The sac is then to be opened to the manner described in a former chapter, and the intestine examined. A probe-

pointed bistoury being then introduced behind the stricture which is formed by the tendon of the transversalis, this is to be divided in an upward direction. In this case, however, it is of little consequence whether the stricture be divided straight upwards, or outwards, or outwards and upwards towards the ilium; as the epigastric artery is in this variety of hernia on the inner side of the hernial sac. But for the same reason a direction of the incision inwards or towards the pubis, must always be carefully avoided; and to prevent any doubt at the time of the operation, the incision upward at the middle of the mouth of the sac will be the most proper.

“After this operation, as this part of the abdominal parietes is weakened by the division of the tendon, a truss must be put on as soon as possible.

“It has been proposed to return into the abdomen the hernial sac, without opening it. For this purpose the stricture is first to be divided, the intestine and omentum returned from it if possible, and the sac is then to be pushed into the cavity of the abdomen.

“In a very small hernia this operation is practicable, because the sac has then contracted no strong adhesion to the surrounding parts, and it can be also readily done in the female; but if the hernia is comparatively large, it cannot be effected without much dissection, which in inguinal hernia in the male could not always be safely performed, on account of the frequent varieties in the course of the spermatic cord, the vessels of which in large herniæ are always more or less turned from their usual course.

“As there would be often much difficulty in executing this part of the operation, it will be best to push back the contents only, without attempting to return the sac, as the patient is equally liable to a future protrusion, although the sac is returned.”

Mr. Cooper has related several cases of inguinal her-

nia in which the hernia was situated at the inner side of the epigastric artery. "The abdominal ring is closed towards the abdomen by the tendons of the internal oblique and transversalis muscles, the lower part of these tendons are inserted into the pubis, and connected with the fascia, which passes upwards from the external oblique muscle at Poupart's ligament; if this tendon is unnaturally weak, or if from mal-formation it does not exist at all, or from violence has been broken, a protrusion of the viscera may then take place immediately behind the ring.

"Below the abdominal ring the appearance of this tumour differs from that of common bubonocoele in being near the penis; and the spermatic cord passes on its outer side instead of its posterior part, particularly at and above the abdominal ring.

"Above the abdominal ring the sac passes directly upwards, so that no part of it takes the usual oblique direction towards the anterior superior process of the ilium, but rather the contrary direction inwards towards the navel. Examined by accurate dissection its course is as follows:—The sac first protrudes between the fibres of the tendons of the transversalis, nearly an inch directly above the ring. It then passes under the fibres of the tendon of the internal oblique muscle. The epigastric artery runs upon the outer side of the hernial sac. The spermatic cord has no connexion with it above the ring. The hernia then emerges from the abdominal ring, the spermatic cord being on its outer side, and it is covered with the fascia given off by the tendon of the external oblique, but not by the cremaster muscle."

This species of hernia when reducible should be treated in the usual way, "the truss should be longer than that required for common hernia, because the hole through which the sac emerges from the abdomen is an inch and

a half further inwards towards the pubis ; so that the pad of the truss must reach round as far as the abdominal ring itself, but still is not to rest upon the pubis. In other respects the form of the truss does not require to be changed.

“ If irreducible, the same means must be employed as in the common species of inguinal hernia.

“ When strangulated, the attempt at reduction should be directed differently from the usual mode. The tumour is, as before, to be grasped with one hand, but the fingers of the other are to be placed at the abdominal ring to knead the hernia at that part, directing the pressure upwards and outwards, to return the tumour into the abdomen.

“ If the operation for this variety of hernia be performed in the manner usually advised in bubonocoele, that is by dilating the hernial sac and stricture upwards and outwards, the epigastric artery will certainly be divided. It has therefore been recommended to alter the direction of the dilating incision to upwards and inwards, to avoid the epigastric artery ; and, if the surgeon is certain as to the species of hernia, that is the safest plan. But, if, in some instances, the operator is directed to make the incision in one way, and in others precisely the reverse, there will always be reason to fear some mistake in practice, which would be attended with the most serious consequences ; such mistakes, it is true, would hardly occur to a surgeon constantly in the habit of dissection, but to the greater number, the distinguishing marks of the two species will not be sufficiently discriminative. It is therefore desirable to point out such a mode of operating as would ensure the safety of the patient, whatever kind of hernia was found. Such are the advantages possessed by the method of making the division directly upwards, opposite to the middle of the hernial sac, for in this direction the epigastric artery is certainly avoided.

“The operation, therefore, is to be performed in the following manner:—The surgeon first makes an incision through the integuments, along the middle of the tumour, from its upper to its lower part, following the longitudinal direction of the tumour; so that if it has any inclination inwards towards the navel, the incision is to incline the same way. The fascia being thus exposed, is divided over the surface of the tumour from the abdominal ring, down to its lower extremity. The hernial sac, which now comes in view, is then opened, from an inch below the ring down to the lower part of the sac, in the same cautious manner as has been formerly described. The surgeon then passes his finger into the sac and feels for the stricture; if at the abdominal ring, he introduces the blunt-pointed bistoury between the sac and the ring, slitting the latter directly upwards, till the aperture is large enough to allow of the return of the parts; if the stricture is above the ring, he follows it with the knife still in the same direction, and anterior to it, opposite the middle of the mouth of the sac, till the dilatation is sufficient to allow his finger to slip into the cavity of the abdomen; after which the hernia is to be pushed up, or, if not in a fit state for that purpose, to be treated as mentioned in a former chapter. The parts anterior to the sac above the ring, and divided by the knife, are the tendons of the transversalis and internal oblique muscles. If the stricture is within the sac, still the same direction is to be preserved, but the knife must then be passed into the sac itself.

“In this way the epigastric artery will, with certainty, be avoided; which it cannot be if the division of the stricture is made outwards, and in the common hernia it will be divided by dilating inwards.” (COOPER.)

Inguinal hernia is much less frequent in women than in men. It is not so liable to be mistaken for other diseases in the female as in the male. The treatment is

nearly the same ; when reducible a truss is to be worn ; if irreducible it should be supported by a T bandage passing over it. It never acquires a large size. When strangulated the usual remedies are to be employed, and if these be unsuccessful the operation is to be performed. The first incision should extend from the abdominal ring to the lower extremity of the tumour which is not far below it : the stricture is to be dilated if the contents of the sac are judged to be in a state proper for reduction ; and if this be doubtful, the sac is to be opened, and the viscera contained in it examined and treated as under similar circumstances in the male.

Inguinal hernia in women, as in men, is sometimes so small as not to appear externally, the parts not having forced their way through the abdominal ring. When the disease is discovered, it is to be treated in the usual manner ; and if an operation become necessary an incision must be made, and the tendon of the external oblique muscle exposed ; this is next to be cut through, and the hernial sac will be brought into view. If the protruded viscera cannot now be returned, the sac must be opened, and if necessary the stricture which will be found at the internal orifice of the inguinal canal must be divided.

CHAPTER XI.

Artificial Anus.

WHEN in consequence of mortification the intestinal tube is partially or completely destroyed, and unites to the wound in the parietes of the abdomen, an unnatural or artificial anus is produced through which the fæces are evacuated. If this aperture be high up in the intestine death is said to result from inanition, in consequence of the deficiency of absorbents to take up nourishment for the body. The intestine contracts considerably below the aperture, and no fæces are voided by the anus, although some mucous evacuations are occasionally discharged.

Such a condition is truly deplorable, and every effort should be made to avoid the evil by effecting the restoration of the parts, previously to mortification, but where the intestine is found mortified, surgical aid is very often unavailing, and the artificial anus is the only event by which life can be preserved.

The involuntary discharge of wind and fæces from the artificial anus, is a great inconvenience, and compresses have been applied with a view to prevent it, but the most common apparatus is a receptacle of leather or horn fastened over the part by means of a band passed round the body. Various machines have been constructed for the purpose, but the more simple are to be preferred for a very obvious reason—they are the most cleanly. Whatever apparatus may be used however, should be so constructed as to make pressure upon the part, in order to

prevent a prolapsus or eversion of the intestine, which is otherwise apt to occur.

When this prolapsus takes place, a tumour of considerable size forms, and sometimes the prolapsed intestine inflames and swells, obstructing the evacuation of the fæces. In general it can be readily replaced and occasions no permanent inconvenience, but it is best to guard against a return of it, by means of a compress of lint bound firmly upon the part, a plan which Desault recommends in preference to all others ; when, however, the reduction cannot be effected by the hand, it must be attempted by gradual and long continued pressure upon the prolapsed parts.

In order to prevent the inconveniences attending such cases, Mr. Cooper recommends a square cushion covered with oil silk which is to be placed over the artificial anus, and a steel truss which exerts but a slight degree of pressure being placed upon it confines the fæces so as to lessen the offensive smell, and allows the patient to seek a convenient situation for an evacuation. This plan answers extremely well if the fæculent matter has some consistence, but if the aperture is in the ileum, the contents of this intestine are with difficulty confined. These remedies only palliate the disease, in order to effect a radical cure, other measures become necessary.

DESAULT accomplished the radical cure of artificial anus in several instances. The means which succeeded in his hands were the application of compresses or plugs of lint, introduced into both portions of the intestine, which by pressing down the angle formed by their junction, make a direct passage for the fæces and dilate the canal at the injured part. When this is done air and fæces are found to pass sometimes through the natural passage, after which the external aperture gradually closes. Laxative medicines are to be occasionally administered during the treatment. Unhappily, however, the plan

found successful in a few cases by Desault, has not succeeded equally with other surgeons, and it evidently cannot be employed where the angle of junction between the two ends of intestine is very acute.

In a patient with artificial anus at the Pennsylvania Hospital Dr. Physick performed an operation, which will probably be found to afford complete relief in many similar cases. The sides of the intestine in this instance, were consolidated laterally, or in Mr. Cooper's language, like a double-barrelled gun. In order to ensure this union a ligature was passed through the intestine and suffered to remain a week, keeping its sides in close contact, after which Dr. Physick cut a hole in the side of the intestine where the two portions had thus united, and by stopping the external orifice, the fæces regained their natural route, the external aperture was afterwards healed, and the patient relieved from his most loathsome complaint; he has for several years enjoyed perfect health.

CHAPTER XII.

Of Femoral Hernia.

HERNIA is denominated femoral or crural, when the protrusion takes place under the crural arch.*

It is entirely impossible to understand this subject without a knowledge of the anatomy of the parts concerned, to the investigation of which much attention has of late been paid by several eminent anatomists and surgeons. The present Dr. Monro, availing himself of the labours of Albinus, Gimbernat, and Hey, has published in his essay on crural hernia, and still more recently in his morbid anatomy, some very important observations on this subject. In addition to his works, the reader is particularly referred to Mr. Astly Cooper's matchless treatise on this subject, and to the valuable essay of Mr. Lawrence in which a few corrections of Mr. Cooper's plates are contained. The necessary dissections being performed in addition to the study of these authors, the student will be prepared to understand the nature and treatment of crural or femoral hernia; but I cannot forbear to repeat the necessity of dissections, for it is certain that no correct ideas can be otherwise obtained. Indeed the best anatomical descriptions, appear sometimes confused and unintelligible, to those who have never made use of the knife in their investigations.

Femoral hernia occurs more frequently in women than in men, and in general commences with a pain on straight-

* Crural arch is a synonyme for Poupart's ligament, which is formed by the lower edge of the tendon of the external oblique muscle, extending from the anterior superior spinous process of the os ilium to the os pubis.

tening the thigh, which extends to the stomach and produces nausea, which subsides when the thigh is flexed upon the pelvis.

“The first distinct external mark of crural hernia is a general swelling of the part easily returnable by pressure, descending in the erect, and ascending in the recumbent posture, and which at first seems to be only the dilatation of the sheath that contains the crural artery and vein. The next appearance is that of a small circumscribed tumour, about the size of the finger’s end, situated under the crural arch, about an inch on the outside of the tuberosity of the pubis, and lying in the hollow between this process and the crural artery and vein. As the tumour enlarges, instead of falling downwards like the inguinal hernia, it passes forwards and often turns over the anterior edge of the crural arch, this being the direction in which there is the least resistance. As it proceeds, the swelling increases more laterally than upwards or downwards, so as to assume an oblong shape, the longest diameter being in a transverse or horizontal direction. In the female it is generally very moveable, and being soft, and the skin not being discoloured, it has the appearance merely of an inguinal tumour of the absorbent glands, but in the male the skin is generally not so loose, the swelling not so distinctly circumscribed, and the tumour appears buried more in the substance of the thigh.” (COOPER.)

This species of hernia seldom acquires a large size; Mr. Cooper, however, has seen it in two cases very large, occupying the whole of the hollow from the anterior superior spinous process of the ilium to the pubis; and he quotes a case from Mr. Thompson of Edinburgh, in which the tumour extended half way down the thigh. In this case, the parietes of the abdomen were so thin that the peristaltic motion of the intestines could be distinctly perceived. The crural hernia is, how-

ever, smaller than the inguinal, and therefore more dangerous.

“The direction in which the crural hernia passes, is obliquely inwards and forwards, and, excepting at first, very little downwards, so that in cutting into this tumour the incision is made in its fundus. This is the general situation of the tumour; but it sometimes happens, that instead of crossing the thigh in the direction of the crural arch, it extends downwards along the edge of the crural vein and the vena saphæna major.

“The crural hernia, when dissected, presents the following appearances: when the skin is removed, the superficial fascia of the external oblique muscle is laid bare, which, though it is of a delicate texture in its common state, when pressed upon by a hernia becomes extremely thickened and very distinct, more especially in a subject loaded with fat. Under this covering there is generally another fascia, precisely of the form of the hernia itself, and which it very closely embraces. A thin fascia naturally covers the opening through which the hernia passes and descends on the posterior part of the pubis. When the hernia therefore enters the sheath it pushes this fascia before it, so that the sac may be perfectly drawn from its inner side, and the fascia which covers it left distinct. The fascia which forms the crural sheath, and in which are placed the hole or holes for the absorbent vessels, is also protruded forwards, and is united with the other, so that the two become thus consolidated into one. If a large hernia is examined, this fascia is only found to proceed upwards as far as the edge of the orifice on the inner side of the crural sheath by which the hernia descends, but in a small hernia it passes into the abdomen as far as the peritoneum and forms a pouch, from which the hernial sac may be withdrawn, leaving this forming a complete bag over the hernia. In a small hernia the fascia is thicker than the sac

itself, but by being gradually extended it becomes thinner and less distinct.

“It may be termed the *fascia propria* of the crural hernia, when this fascia is divided, a quantity of adipose membrane is found between it and the sac, and when this is cut through, the peritoneal sac itself is exposed. Behind the hernial sac is the fascia lata, and the sac rests in the hollow between that part of it which covers the crural vessels, and that which passes over the pectineus and triceps muscles so that the fascia lata is situated posteriorly to the hernia.”

The sac in crural hernia is pyriform, resembling in shape the small bottles of elastic gum.

“The orifice of the sac is surrounded by a fascia or cellular membrane, much condensed by an adhesive process which forms with the fascia below a complete bag, out of which the hernia may be drawn and the bag left behind perfect. Between the orifice of the hernial sac and the tuberosity of the pubis is situated the insertion of the external oblique muscle into the linea ileo-pectinea, and ligament of the pubis. Behind it, is the pubis covered by its ligament and fascia iliaca; anterior to it, is the beginning of the posterior edge of the crural arch, and below this the lunated edge of the fascia lata and part of the crural sheath; and on its outer side is a thin process of fascia, which passes between it and the iliac vein. Indeed, it is according to the size of the hernia that there is more or less remaining of the original fascia, which extends from the insertion of the external oblique, to the iliac vein. If the hernia is small, a process of this fascia remains round the orifice of the sac; but if it is large, the orifice of the sac occupies the whole space between the insertion of the external oblique and crural vein; excepting that a thin portion of fascia still remains between the vein and the sac. This vein runs on the outer side of the hernial sac, about half an inch from the

centre of its orifice, and half an inch beyond the vein; and exterior to it is the centre of the external iliac artery; the epigastric artery arises from the external iliac, about three quarters of an inch from the centre of the sac, and as it passes forwards and upwards it approaches this point about a quarter of an inch nearer. The general distances of the different parts are as follows.

MALE.

INCHES.

“ From the symphysis pubis to the centre of the orifice of the sac. - - - -	2
the centre of the orifice of the sac to the external iliac artery. - - - -	1
the centre of the orifice of the sac to the centre of the external iliac vein. -	$0\frac{1}{2}$
the centre of the orifice of the sac to the origin of the epigastric artery. - -	$0\frac{3}{4}$
the centre of the orifice of the sac to the inner edge of the internal abdominal ring. 1	
the tuberosity of the pubis to the centre of the orifice of the crural hernia. -	1

FEMALE.

“ Each measure is from one-eighth to one-fourth of an inch more where the pelvis is large and well formed.

“ The spermatic cord of the male, and the round ligament of the uterus of the female, pass about half an inch anterior to the mouth of the hernial sac, being first situated to the outer side, and afterwards crossing its fore part.

“ When the opening through which the hernial sac has passed is examined anteriorly, it will be found that the sac, after descending a little way into the crural sheath, turns inward and protrudes the inner part of this

sheath where the absorbent vessels pass. The hernial sac is here placed between two columns of fascia of the crural sheath; the one proceeds from the anterior part of the insertion of the external oblique muscle into the pubis, is reflected upon the crural vein, and passes over the neck of the sac: the other attached to the point of insertion of the external oblique into the linea ileo-pectinea and ligament of the pubis, is continued behind the neck of the sac, and is at last undistinguishably blended both with the fascia that covers the crural vein, and with that part of the fascia lata which passes over the pectineus muscle.

“The same general symptoms characterize crural as inguinal hernia; it appears in the erect, and disappears in the recumbent posture; it dilates when the patient coughs, is elastic and uniform to the touch when it contains intestine, and then gives a gurgling noise when it returns into the abdomen. When it contains omentum the surface is less equal, it feels doughy, and gives no particular sound when it returns into the abdomen.

“The crural hernia is less liable to be confounded with other diseases than the inguinal, because tumours of the groin from other causes, are much less frequent than those of the scrotum, but still great care is required to prevent the practitioner from mistaking the disease, and persons have to my knowledge, lost their lives from such errors, or from the swelling being altogether overlooked.” (COOPER.)

Crural hernia bears some resemblance, however, to some complaints from which it is important to distinguish it.

The glands of the groin are sometimes enlarged in the situation where femoral hernia is generally situated, and such glands have been mistaken for this species of rupture; there can seldom, however, be any difficulty in discriminating them unless both complaints exist

in the same groin, and then if strangulation take place the difficulty ceases, and if not, it is of no importance.

Psoas abscess has some of the appearances of femoral hernia, the matter passing down the thigh in an erect posture and returning into the abdomen when the patient lies down; coughing and other efforts of the abdominal muscles produce an enlargement of the tumour in both cases. In general, however, the symptoms which precede psoas abscess sufficiently indicate its existence, and the fluctuation of the pus is easily felt; pressure on the abdomen occasions a tension in the tumour which cannot be produced in hernia. The tumour is also in psoas abscess, generally nearer the spine of the ilium than in hernia, and is larger; it is unattended with any interruption to the alvine evacuations.

Inguinal and femoral hernia are often mistaken the one for the other, they may be distinguished by the following marks. In inguinal hernia the neck of the hernia may generally be distinguished at the abdominal ring, considerably above the os pubis, whereas in femoral hernia, it is lower, and more towards the outer side. The crural arch in femoral hernia may be traced in its course from the pubis to the ilium, passing above the hernial tumour; in inguinal hernia it cannot be felt, as the tumour is situated above it.

Crural hernia is said to occur most frequently on the right side; it certainly occurs oftenest in the female sex, and in those women who have borne children, oftener than in others.

A portion of intestine most frequently forms the contents of the sac in femoral hernia, but occasionally the omentum is also found, and sometimes the case is an entero-epiplocele. The ovaria have been found contained in the sac of femoral hernia, and Mr. Cooper has given a plate of a case in which the uterus was drawn to the orifice of the hernial sac.

This hernia seldom occurs in early life.

Crural hernia is a more dangerous complaint than Inguinal ; it is smaller and therefore oftener attended with obstruction of the bowels ; it returns with less facility into the abdomen, because the opening by which it passes is narrower and for the same reason it is more apt to be strangulated.

The reduction of a strangulated crural hernia is less easy than that of an inguinal, and some difference is to be observed in the manner of applying the taxis to effect it, Mr. Cooper directs it to be done in the following manner.

“ The position of the patient is to be such as to relax the abdomen as much as possible, for which purpose the shoulders should be elevated, and the thighs bent at right angles with the body ; but even this posture produces but little effect, unless the knees at the same time are brought together. If the parts are dissected directly with the view of observing what difference is made in the relative tension of parts in the dead body, it will be found that when the thighs are extended, the crural arch and all its fasciæ are upon the stretch ; when the thighs are bent, but the knees turned outwards, the fasciæ are somewhat relaxed ; but when the thighs are bent and the knees brought together, the crural arch and its fascia are all extremely loosened, and still more are the parts loosened by throwing one thigh, when bent, across the middle of the other. When the body is in the recumbent posture, the thighs bent, and the knees thrown inwards, the surgeon is to place himself over the body of the patient, and putting both his thumbs on the surface of the tumour, he is to press gently directly downwards, as if he were endeavouring to press the tumour into the thigh rather than towards the abdomen. If this pressure is steadily kept up for some minutes till the surface of the tumour is brought even with the line of the crural arch, the hernia may then be pressed towards the abdomen and will return into that cavity.

I am convinced that much of the difficulty found in returning this species of hernia often depends on the improper direction given to the pressure ; for if the tumour is pressed at first towards the abdomen, it turns over the crural arch instead of turning under it, and then the utmost degree of force which may be applied will endanger the bursting of the intestine, but cannot contribute to its reduction."

In order to keep the parts from descending a spring truss must be used, similar to that recommended for inguinal hernia, except that the pad must be constructed so as to act lower down. (See Plate 1.) It seldom produces a permanent cure and therefore should be worn constantly.

Crural hernia is sometimes irreducible from adhesions of its contents, or from the contained parts becoming too large to pass back into the abdomen.

When strangulated the symptoms are the same as in cases of inguinal hernia ; the seat of the strangulation according to Mr. Cooper, may be in three different places ; first, in the crural sheath, and semilunar, or lunated edge of the fascia lata ; secondly, at the posterior edge of the crural arch ; or thirdly, in the mouth of the hernial sac and fascia which covers it.

"With respect to the first of these, it will be found that a portion of the crural sheath remains below the crural arch, which forms a strong circular band by which the hernial sac is surrounded. When the sac is drawn from the sheath in the male, the orifice by which it has passed will be found to be formed by two strong columns of fascia, one passing above, and the other below the sac, and meeting on the inner side at the posterior insertion of the external oblique muscle into the ligament of the pubis, and on the outer side at that part of the sheath which covers the crural vein. In the female these columns are not equally strong, still a portion of the

sheath surrounds the hernial sac. If the hernia is large, it reaches to the semilunar edge of the fascia lata, and is compressed by it.

“The second place at which the stricture is found, and which requires division in large crural herniæ, is the posterior edge of the external oblique muscle and the fascia transversalis, which pass before the mouth of the hernial sac, and which extending inwards to be inserted into the pubis, forms also the inner boundary of the sac at this part, whilst a small process of fascia on the inner side of the vein forms its outer boundary. Thus then there are two seats of stricture, one the edge of the aperture in the crural sheath, and the other about half an inch above it, formed by the posterior edge of the external oblique muscle.

“The mouth of the hernial sac is the other seat of the stricture.

“This aperture is very generally small when compared with the size of the hernial sac, and being much pressed upon by the posterior edge of the crural arch it undergoes a slow process of inflammation, which thickens very much the fascia in which it is enclosed. If the sac is removed with the fascia which encloses it, its mouth will be found to form a dense and compact substance, which firmly resists any attempts to dilate it by pressure.

“The anterior edge of the crural arch, or Poupart's ligament, does not form the stricture, or require any division, excepting in very large herniæ.

“The possibility of crural hernia being the cause of strangulation, renders it even more than in inguinal hernia necessary for a physician, called in on account of symptoms of ileus, to inquire whether there is any tumour in the groin, or the upper part of the thigh, for in crural hernia the tumour is smaller and less prominent

than in the inguinal, and more liable to be overlooked. These tumours are sometimes so small that it is not without hesitation that the surgeon determines with respect to the operation; for they are, when small generally covered with an absorbent gland, and with so much difficulty distinguished, that I confess, I have more than once began the operation with much doubt about the nature of the tumour, making it rather the means of determining with certainty, than being assured that it was the disease which I suspected.

“The treatment which this hernia requires when strangulated, differs but little from that of inguinal: the mode of using the taxis has been already explained.

OF THE OPERATION FOR THE CRURAL HERNIA.

“The patient is to be placed upon a table three feet six inches in height, the body lying in a horizontal posture, but with the shoulders a little elevated; the legs as high as the knees, hanging over the edge of the table; and the thighs a little bent, in order to relax the abdominal muscles. The bladder must be emptied and the diseased side shaved.

“The incision is to be begun an inch and a half above the crural arch, in a line with the middle of the tumour, and extended downward to the centre of the tumour below the arch. A second incision nearly at right angles with the other is next made, beginning from the middle of the inner side of the tumour and extending it across to the outer side; so that the form of this double incision will be that of the letter T reversed. The advantage of this form of the incision is, that it gives an opportunity both of examining the parts distinctly, and of turning them aside to give a view of the orifice by which the hernia has descended, and of the parts which form the external portion of the stricture.

“For want of this precaution I have known great difficulties occur in the operation, the incision, when single, being too small to give a sufficient view of the parts, and the depth at which the hernia is situated not allowing the surgeon to have a distinct view of the progress of the operation.

“The longitudinal incision sometimes occasions a slight bleeding from the division of the external pudendal artery, and it is better to secure the vessel before any thing further is done.

“The first incision exposes the superficial fascia, which is given off by the external oblique muscle, and which covers the anterior part of the hernial sac; but if the patient is thin, and the hernia has not been long formed, this fascia escapes observation, as it is then slight and delicate, and adheres closely to the inner side of the skin.

“When this fascia is divided, the tumour is so far exposed that the circumscribed forms of the hernia may be distinctly seen, and a person not well acquainted with the anatomy of the parts would readily suppose that the sac itself was now laid bare. This, however, is not the case, for it is still enveloped by a membrane, which is the fascia that the hernial sac pushes before it as it passes through the inner side of the crural sheath. This membrane, the fascia propria, is to be next divided longitudinally from the neck to the fundus of the sac; and if the subject is fat, and adipose membrane lies between it and the sac, from which it may be distinguished by seeing the cellular membrane passing from its inner side to the surface of the sac. This is in my opinion, the most difficult part of the operation, for the fascia propria is very liable to be mistaken for the sac itself; so that when it is divided, it is supposed that the sac is exposed and the intestine laid bare; following up this idea, the

stricture is divided in the outer part of the sac, and the intestine, still strangulated, is pushed with the unopened sac into the cavity of the abdomen.

“It must be remembered, however, that in large herniæ the fascia propria of the sac is sometimes inseparably united to the superficial fascia, so that the same incision divides both.

“The hernial sac being exposed is to be next opened ; and to divide it with safety, it is best to pinch up a small part of it between the finger and thumb, to move the thumb upon the finger by which the intestine is distinctly felt, and may be separated from the inner side of the sac ; and then to cut into the sac, by placing the blade of the knife horizontally. Into this opening a director should be passed, and the sac opened from its fundus to the crural sheath. A small quantity of serum usually escapes when the sac is opened, which is either transparent or sanious according to the length of time that the strangulation has continued. The intestine, or omentum, or both, then become exposed.

“It often happens, however, that there is no fluid contained in the sac of femoral hernia, even although no adhesion exists between the sac and its contents ; a circumstance which probably may be attributed to the small size of the sac and its contents, and the very limited secreting surface which it affords, for when there is much unadhering intestine, there is always a notable quantity of serum. If the strangulation has continued for many hours, the intestine is also covered with a coating of coagulable lymph, but not otherwise.

“The next part of the operation consists in the division of the stricture ; for this purpose the finger is to be pushed gently into the sac, and the omentum and intestine separated from its anterior part, the probe-pointed bistoury which I have recommended, which does not cut

near its point, is to be pushed into the crural sheath at the anterior part of the sac, and the sheath is to be cut as far as the anterior edge of the crural arch, or Poupart's ligament. In a small hernia this division, which does not exceed half an inch, will be sufficient for the reduction of the parts.

“But when the sheath has been thus divided, if the intestine, when slightly compressed, cannot readily be emptied, the finger must be passed at least half an inch higher, and then the posterior edge of the crural arch and the fascia that covers it will be felt, forming a sharp edge, strongly compressing the mouth of the hernial sac. To divide this edge the knife must be carried within the stricture, and being inclined obliquely inwards and upwards at right angles with the crural arch, a cut may be very safely made in that direction sufficient for the purpose of liberating the intestine from pressure.

“The two incisions which I have directed being made from the interior of the sac, any stricture arising from the contraction of the sac itself will be at the same time removed, and the protruded parts be thus completely liberated.

“If the hernia is large and any pressure has been made on its contents by the semilunar edge of the fascia lata, the first incision will divide that edge.

“Much danger will arise from any forcible attempt to press the intestine into the abdomen after the dilatation of the opening of the crural sheath; for if the stricture is at the second part, viz. at the posterior edge of the crural arch, this makes so firm a pressure on the parts, that the intestine will rather give way than the stricture will yield, and I am induced to believe, that this seat of the stricture has not been generally understood; yet in several of the cases in which I have operated, it has been situated there. Mr. John Pearson also informed me that he lately operated upon a crural her-

nia, and divided all the parts which he could at first feel forming the stricture, but still an impediment existed to the return of the protruded parts, and he was obliged to divide the stricture much higher up before he could return them.

“Surgeons talk very carelessly upon the subject of dividing the stricture; they say that the finger must be put into the sac, and wherever the stricture is felt it should be divided. Again, it is said, the stricture is situated on the inner side of the sac, and derived from the pressure of the insertion of the tendon of the external oblique, or what they call Gimbernat’s ligament. They do not consider that a stricture is a circle produced in the same way as if a cord were tied round the protruded parts, and that the division might be made at any part excepting the posterior, where the bone is placed, if other circumstances did not prevent it. The stricture may be divided on the inner side of the sac, that is, towards the pubis; but to this there are strong objections to be mentioned hereafter. It cannot be divided directly outwards, for there the crural vein must necessarily be injured, and if the division is made upwards and outwards, towards the spinous process of the ilium, the epigastric artery is much endangered. However, this artery is not so liable to be cut in the crural hernia as has been imagined; for it does not approach nearer than half an inch from the upper and outer part of the sac, and an incision of half an inch is more than is usually required to liberate the protruded parts in crural hernia. The stricture may be safely divided upwards and with slight obliquity inwards.

“Mr. Hey, whose name should be never mentioned but with respect, who is not contented with the mere practice of his profession, but who studies to improve it, advises that the knife should be introduced on the in-

ner side of the sac, and the division be made directly upwards.

“ In the female, if the hernia is large, it will be sometimes, though very rarely, necessary to cut through the anterior edge of the crural arch, or Poupart’s ligament, and this may be done from the inner side of the hernial sac by cutting obliquely inwards and upwards. But in a large hernia in the male subject, when the division of the crural arch is required, a different operation becomes necessary to prevent the spermatic cord from being injured. When the parts have been laid bare, and are found to be too large to be liberated by the division of the sheath and posterior edge of the crural arch, an incision should be made through the tendon of the external oblique muscle over the mouth of the hernial sac, about a quarter of an inch above the crural arch, which will expose the spermatic cord. This being drawn by the finger, or by a curved line, and removed from the direction of the incision, the surgeon carries his finger into the sac with the bistoury upon it, and the anterior edge of the crural arch is cut without the smallest risk to the spermatic cord.

“ When the stricture has been divided, and the protruded parts liberated from pressure, the state of the intestine must be examined, and if the circulation returns in it, if the dark colour produced by the constriction disappears or is much diminished, and if on drawing down the intestine, the part at which it had been girt by the stricture appears uninjured, it may then be returned into the cavity of the abdomen. If the intestine is mortified, that portion of it is to be cut away, and the ends of the intestine joined; and I would advise, that instead of leaving an opening in the intestine for the escape of the fæces, after the contents of the intestine have been evacuated at the wound, four ligatures should be applied, so as to shut the bowel in the whole of its circumference,

and my reasons for differing in this respect from the opinion I gave in my former work are, that I have found in one case, that, by leaving a small opening, an artificial anus followed, and in another that where the upper part of the ilium had been mortified, by the small aperture that was left, every thing the woman swallowed was so speedily discharged at the wound that it afforded no sustenance, and she died in four days after the operation. The stricture must be very freely dilated when the restoration of the canal is attempted, or the fæces will not pass through the intestine; and if after twelve hours no fæces have passed by the anus, and the vomiting continues one of the stitches must be cut, and the chance of sustaining life by an artificial anus must be given.

“I should still have great fears of returning the intestine into the abdomen after sewing it, notwithstanding the experiments which were made by Mr. Thompson and myself, and since confirmed by Mr. Smith, in his *Inaugural Dissertation*, which proved that an intestine may be returned into the abdomen after being secured by ligatures. But it is to be recollected that in the disease before us the intestine is highly inflamed, and that ligatures ulcerate so quickly in inflamed parts that there would be great danger of the escape of the fæces into the cavity of the abdomen; for in a case in which I left the intestine within the sac, after securing it by ligatures, the intestine burst open on the third day and an artificial anus was produced. I therefore think it safer to carry the intestine to the mouth of the hernial sac and there fix it by its mesentery.

“If the intestine is mortified, it requires great care in the operation to prevent the portion within the abdomen from being torn from the mortified part, which if the finger is forcibly introduced into the sac will undoubtedly happen, and the fæces escaping into the abdomen will destroy the patient in a few hours. To prevent this,

after exposing the intestine, and finding it mortified, the finger should not be put into the mouth of the sac, but the bistoury only be passed into the stricture ; and when this is divided, the intestine is to be gently drawn down into the sac to expose the part at which it has been girt.

“ If the intestine adheres to the sac, extraordinary caution is required, both in the division of the stricture and in separating the adhesions. It is best to begin with gently separating the adhesions with the finger rather than with the knife, which can generally be effected without doing violence to the parts ; but if the adhesions are short and very firm, portions of the sac must be cut away and returned into the abdomen with the intestine to which they adhere ; the stricture too must be divided fibre by fibre with extraordinary care.

“ Putting a ligature around the whole of the protruded omentum is either useless or dangerous : if it is placed on the mortified part, it is obvious it must be useless, as the sloughing process will go on above it : if it is placed upon the healthy part of the omentum, why divide the stricture, as another is made immediately by the thread which is applied around it.

“ Leaving the omentum in the hernial sac to slough appears to me unadvisable because it is unnecessarily preserving a discharge for a length of time and protracting the cure. I have never seen this intentionally done, but in a patient in Guy’s Hospital ; the omentum which had been returned into the abdomen redescended into the sac on the sixth day from the operation and gradually sloughed, keeping up during the time a very offensive discharge, and a great degree of constitutional irritation.

“ When the protruded parts have been returned into the cavity of the abdomen, sutures are to be made upon

the integuments, and the wound closed as carefully as possible by lint, adhesive plaster, and bandage.” (COOPER.)

Varieties in crural hernia are more rare than in most other species. Some of the most frequent have been noticed by Mr. Cooper; the only one which I think it important to mention is that in which the obturator artery passes round the neck of the hernial sac. Of this variety which Mr. Cooper never saw he quotes two cases; I have myself seen one. In this case no part of the neck of the sac could be felt free from the pulsation of a very considerable artery. Dr. Physick very promptly divided the stricture by cutting in the usual direction, but taking great care to make a very small incision or rather scratch with the point of a bistoury, though the stricturing tendon. A very small dilatation of the stricture in these cases is sufficient, and therefore, I think the direction in which the incision is made is of less importance than many surgeons have imagined, as we may safely cut directly towards a blood vessel, without risk of wounding it provided the surgeon be cautious and dexterous.* As Dr. Physick's patient happily recovered and is now living I am unable to describe particularly

* For a more minute account of this subject, I refer to Cooper, Lawrence, and Monro; the last writer supposes that in one of twenty cases, this variety occurs; he adds “there is still another variety as to the distribution of the epigastric and obturator arteries; these arteries in some cases come off from the anterior iliac artery by separate trunks; and the obturator artery passes around that part of the crural arch called Gimbernat's ligament, and is attached to it by cellular substance. When this happens, the obturator artery, by the descent of a portion of the intestine through the crural ring, is pressed upon the very part of the crural arch divided by Gimbernat, in his operation for crural hernia.

“I have seen the obturator artery sent off from the external iliac artery, about an inch and a half above, and in others, about an inch below the epigastric artery; and in other cases, even on the outer side of the pelvis, from the superficial femoral artery; in which case, the artery ascends along the pectineus muscle, and enters the pelvis at the crural aperture. The artery in this case is placed behind the crural hernia.” (Monno.)

the anatomy of the parts, but in one of the cases related by Mr. Cooper, from Dr. Barclay it was found that the “epigastric and obturator arteries had arisen by a common trunk and that they had passed, anterior to the sac before they divided; after which the epigastric artery proceeded upwards to the rectus muscle, and the obturator artery passed backwards on the inner side and close to the neck of the sac to the obturator foramen through which it usually passes. The obturator artery indeed very frequently deviates from its natural course, and instead of arising separately from the internal iliac artery, it derives its origin from the external iliac in common with the epigastric. But in all the cases which I have myself dissected where this variety existed with crural hernia, the obturator has passed into the pelvis on the outer side of the neck of the sac entirely out of the reach of any injury by the knife. In twenty one preparations of crural hernia I found six had this variety in the origin of the obturator artery. When therefore this artery passes before to the sac (as in the case observed by Dr. Barclay) the arterial trunk common to it and to the epigastric is of unusual length; for when the trunk is short, the obturator passes behind the sac. A hernia thus situated is surrounded by blood-vessels, except at its posterior part, which might seem to render it advisable to deviate from the usual mode of operation to prevent this blood-vessel from being wounded. This, however, is not so liable to happen where the division of the stricture is made upwards, or a little upwards and inwards; for I suspect it will be found that the greatest distance between the artery and the hernial sac is at its anterior part. It is impossible to feel this artery before the introduction of the knife, for the finger cannot be passed behind the posterior edge of the crural arch, beyond which this artery is placed, until the stricture has been divided. The sac therefore is to be carefully divided

anteriorly ; but even supposing the artery to be wounded in the operation, it may be asked, what other direction of the wound would afford greater facility of tying the bleeding vessel ? For by slitting up the crural arch, and drawing down the mouth of the hernial sac, the vessel would be brought into view, and might be secured.” (COOPER.)

The operation proposed by Gimbernat of cutting inwards, is more difficult than that which has been described, and is attended with more danger of wounding the intestine, besides which in some cases the opening thus made is not sufficiently large to permit the return of the prolapsed parts, and the obturator artery is in great danger of being wounded, in which case it could not be tied up, whereas if this vessel should be wounded in the operation which has been recommended it could be very readily secured ; these reasons have induced Mr. Cooper and other surgeons to decline the operation.

CHAPTER XIII.

Of Exomphalos or Umbilical Hernia.

THE sac in umbilical hernia passes through a hole at the navel by which in the fœtus the umbilical vessels had been transmitted. This aperture is situated in the linea alba, and is never completely filled up with tendon, but with condensed cellular substance and the remains of the umbilical vein and arteries.

The peritoneum is perfect behind the umbilicus and consequently the umbilical hernia has a sac similar to that of the herniæ already described.

“Umbilical hernia begins in the form of a small tumour, about the size of the tip of the finger, at the navel which can be returned by very slight pressure into the cavity of the abdomen, but by directing the patient to cough, it immediately reappears. As it increases in bulk it begins to gravitate, so that the anterior extremity of the bend is generally below the level of the umbilical opening. If the person is thin, it becomes very pendulous and distinctly circumscribed, and is then usually of a pyriform shape. If nothing is done to check its growth, it grows to an enormous size, extending downwards towards the pubis. The disease in this state produces a great deal of suffering, and often endangers life if the hernia is intestinal. Almost every thing that is eaten too produces flatulency, pain in the protruded part, and sickness; and even slight pressure to return it, gives the same uneasy sensations when the intestine is passing back through the abdominal opening. If no bandage is

habitually worn to confine the hernia, the patient feels so much weakness and sinking at the pit of the stomach as to be often incapable of any exertion. The bowels also are generally irregular, and if the tumour becomes inflamed, it swells to a great size, and vomiting and constipation ensue. These symptoms are much more frequently happening in this than in the other species of hernia, but at the same time they are generally more easily removed."

Umbilical hernia almost uniformly contains both omentum and intestine.

"The umbilical hernia is very frequent in the young subject, and forms a tumour like the inflated finger of a glove, with a slight obliquity downwards. It very generally contains intestine, which may be easily returned, unless the orifice is very small, in which case the cries of the child shew that some pain is given. Irregular bowels and costiveness, succeeded by griping and long continued purging, are attendant on this disease.

"A fascia may be distinctly traced over the tumour when the hernia is small, but when it becomes of large size, the skin, sac, and fascia become so united at the anterior part of the swelling, that it is difficult to separate them there, although the fascia may still be distinctly observed on the sides of the tumour.

"There are some varieties in the umbilical hernia which require to be mentioned. First, with respect to figure, in a thin subject it is generally pyriform, as I have already stated, but in fat persons it forms a broad and flat swelling, which extends as much upwards as downwards. Sometimes in consequence of there being a large quantity of fat which separates the skin at a great distance from the abdominal muscles, the hernia projects as far as the skin of the navel, and then extends upwards and downwards so as to form a tumour which is

scarcely apparent upon a superficial examination. But when the hernia assumes this extended and flattened form in thin persons (which is sometimes the case,) it can be embraced by the hand, and its dimensions readily ascertained. I have also seen this umbilical hernia divided into a number of different cells.

“Besides this variety in the figure of the hernia, there is a great difference in the state of the sac. When this is small, it is as complete as in other herniæ; but I have an example in my possession of the sac having been either absorbed or burst, by which openings have been formed and portions of omentum protruded through them, producing small herniæ through the sac of the large one.* In this instance two small omental herniæ are seen protruded through the hernial sac, and on the opposite side an opening may be observed through which either omentum or intestine might have passed.” (COOPER.)

A curious case of this disease is described by Mr. Cooper in which two sacs were found.

The causes which most frequently occasion umbilical hernia are pregnancy, obesity, and ascites in adults, and in children, it is occasioned by an unusually large umbilical cord, and a congenital deficiency of tendon at the navel. I have known umbilical hernia suddenly formed during parturition, the patient was sensible of something giving way at the umbilicus, she was flooding at the time, and was delivered of twins; a tumour formed soon after and gradually augmented to a very large size.

When the reduction of umbilical hernia is to be effected by the taxis, the patient should be placed on the back, the pelvis and shoulders being slightly raised, and the thighs bent forwards.

The tumour should be pressed backwards, and somewhat upwards, as the neck of the sac is not in the centre of the tumour but above it.

* An engraving of this may be seen in Mr. Cooper's work.

When the reduction is effected a truss should be worn; Mr. Hey recommends a new instrument of this kind constructed by Mr. Marrison of Leeds, and in large umbilical hernia it deserves the preference, but in cases where the tumour is small, a circular spring and pad constructed like the truss for inguinal hernia, answers just as well, and is much more simple. Graduated compresses, of a conical form, bound round the body answer in many cases, where the irritation of the steel spring is found inconvenient, which in very corpulent persons is frequently the case, a great variety of bandages and belts are in use for this purpose; the most convenient I have seen used, resembles a pair of drawers the compress being fixed to the middle of the waistband prevented from descending by a suspensory shoulder strap.

When umbilical hernia becomes strangulated, the usual remedies for effecting the reduction are to be employed, and if they fail, the stricture must be dilated with the knife. I once witnessed a most remarkable reduction of umbilical hernia in a lady, upon whom all the usual means of accomplishing this purpose had been perseveringly tried for several days without effect. The operation was accordingly commenced by Dr. Physick, and as soon as the skin over the tumour was divided, the lady being greatly terrified, a gurgling noise was heard in the hernia, and a very slight pressure being made it suddenly returned into the abdomen, and no unpleasant symptom followed.

OF THE OPERATION FOR UMBILICAL HERNIA.

This is generally very simple: the integuments are to be divided over the tumour, with great caution not to wound the intestine, as there is frequently no sac, or a

very thin one, intervening between the skin and the protruded viscera. The external incision should in small herniæ extend from the top to the bottom of the tumour, but in large herniæ this extent of incision is unnecessary; after which its contents are to be exposed by a small incision through the sac, or parietes of the hernia. When this opening is made, a small quantity of fluid escapes; a director is now to be introduced and the parts divided sufficiently to permit a finger of the surgeon to enter; with this finger he very readily finds the aperture at the umbilicus; a probe-pointed bistoury* is now to be passed along the finger, and the tendon divided upwards sufficiently to permit the protruded parts to be returned without much force; the intestine is to be first returned, and afterwards the omentum, unless it be necessary to remove it by the knife. The integuments are next to be approximated and retained in contact by one or two stitches, or if the aperture into the sac be very small, by adhesive plaster.

Mr. Astly Cooper, with a view to diminish the danger of peritoneal inflammation, after the operation for umbilical hernia, has in two instances performed the operation in a different manner. "As the opening into the abdomen is placed towards the upper part of the tumour, he began the incision a little below it, that is, at the middle of the swelling, and extended it to its lowest part. He then made a second incision at the upper part of the first, and at right angles with it, so that the double incision was in the form of the letter T, the top of which crossed the middle of the tumour. The integuments being thus divided, the angles of the incision were turned down, which exposed a considerable portion of the hernial sac. This being then carefully opened, the finger was passed below the intestine to the orifice of the

* That of Mr. Cooper is to be preferred.

sac at the umbilicus, and the probe-pointed bistoury being introduced upon it, he directed it into the opening at the navel, and divided the linea alba downwards to the requisite degree, instead of upwards, as in the former operation." When the omentum and intestine are returned, the portion of integument and sac which is left at the upper part undivided, falls over the opening at the umbilicus, covers it and unites to its edge, and thus lessens the risk of peritoneal inflammation by more readily closing the wound.

The same writer recommends, when the hernia is very large, to dilate the stricture without opening the sac at all. In such cases he has succeeded by making a small incision opposite the neck of the tumour, exposing the fascia which covered it, passing a probe-pointed bistoury between the fascia and the sac, and dividing the former to the edge of the umbilical ring, then putting his finger to the edge of the linea alba, he passed his knife through the umbilical hole behind the linea alba, and made a small division of it upwards, then withdrawing the knife, he pressed upon the tumour and it immediately returned.

Mr. Cooper states that "this operation did not take more than four minutes in its performance; it is attended with no more danger than the taxis, and if insufficient the operation may be afterwards performed in the common way by extending the same incision."

When strangulation takes place in an old irreducible hernia, the stricture should be divided in the manner last described, and then the contents of the intestine can be readily pressed out of the hernial tumour into the abdomen, and the usual course of the *fæces* is restored; an operation which has been successfully performed by Mr. Cooper.

The colon is more frequently found in umbilical her-

nia than any other intestine, and its appendices epiploicæ are often enlarged and indurated,—When found in this condition it is proper to remove them.

When the sac contains a very large quantity of omentum, or when the omentum adheres extensively and has become indurated, it is to be removed with the knife, care being taken to secure the bleeding vessels by ligatures; the portion of divided omentum should be left as a plug to fill up the orifice of the hernial sac.

In one case of umbilical hernia, I was greatly embarrassed, by finding the intestine strangulated in several different places by bands passing from the omentum to the intestine. These bands, which were elongated adhesions of a very firm texture, converted the hernial sac into a cavity resembling the ventricles of the heart; the morbid productions extending like the chordæ tendineæ, from one part of the cavity to another; under several of these cords, portions of the ileum had become strangulated, and by cautious dissection I succeeded in liberating and returning into the abdomen the recently protruded parts.

Umbilical hernia, in very young infants is by no means unusual; Dr. Hamilton declares that for the last seventeen years, he has usually seen two cases annually of umbilical hernia in new born children.

When the hernia is small it may be cured by compress bandages; Mr. Hey succeeded in effecting the radical cure of a case of congenital exomphalos in which the tumour was as large as a hen's egg, by means of a conical compress. Dr. Hamilton has used a mode of treatment by no means so safe or simple: after reducing the contents of the sac "a ligature was tied firmly round its base after which the sac was cautiously opened. It proved to be the sheath of the umbilical cord. With two

silver pins and some adhesive straps the separated parietes abdominis were brought closely together. The sac was allowed to drop off, and in a few days the cure was complete."

Umbilical hernia in young subjects according to Desault, occurs more frequently at the age of two or three months than at birth. In some rare instances the complaint which is produced and increased by the cries of the infant gradually subsides, but this event is unusual.

To obtain a radical cure in infancy is of the utmost importance, because in the adult it is impossible. By keeping the viscera constantly in the abdomen the umbilical ring will gradually contract, and a cure will be effected by its obliteration.

Desault has of late years revived the ancient mode of treating this complaint by the application of a ligature, and in upwards of fifty cases he found it completely successful. The mode of operating is very simple. The child should be laid on its back, the thighs being somewhat bent, and the head inclined forwards. The surgeon having returned the protruded viscera presses on the opening with one hand whilst with the other he raises the sides of the sac, and ascertains that no part remains unreduced. When this is done a waxed ligature is to be passed several times round the basis of the hernia and secured at each turn by a double knot drawn tight enough to occasion "an inconsiderable degree of pain." The tumour is to be covered with lint, over which cempresses are to be applied secured by a bandage and shoulder straps. In a day or two after the first ligature is applied, the parts enclosed within it shrink, and it becomes necessary to tie a second ligature considerably tighter. A third ligature some days after often becomes necessary. In eight or ten days the tumour falls off, and leaves a small ulcer which speedily

heals. Although the umbilicus is by this time sufficiently firm to resist the protrusion of the viscera yet prudence dictates the propriety of a bandage and compress, for several months. The probability of the cure diminishes with the age of the patient, and in Desault's hands it failed in a girl aged nine years. The operation should therefore be recommended and performed early.

This short account of umbilical hernia I shall conclude by describing a mode of operating which has been proposed by Dr. Physick. It consists in making a crucial incision through the integuments of the tumour, and dissecting the four angles thus formed down to the neck of the sac; an opening is next to be made into the sac at its upper part of a sufficient size to afford a view of its contents; should these be sound they are to be reduced if practicable, without dilating the umbilical aperture; but if this cannot be done, that aperture is to be enlarged outside of the sac, taking care not to wound the neck of the sac. When the contents of the sac are reduced, a ligature is to be tied round its neck.

The chief advantages proposed by this mode of operating are, that a full examination may be made of the protruded viscera by a free opening of the sac, and all danger of peritoneal inflammation from this opening is precluded by the ligature which produces a closure of the neck of the sac and prevents the exposure of the abdominal cavity. Dr. Physick has never had an opportunity of trying the plan, but I am happy to state that Dr. Wistar has performed it with complete success.

CHAPTER XIV.

Of Ventral Hernia.

THIS resembles the umbilical, except that the protrusion instead of being at the naval is situated in some other part of the parietes of the abdomen; most frequently in the linea alba, but sometimes in the linea semilunaris. It is a very rare complaint.

The symptoms of ventral hernia resemble those of the umbilical, except that the stomach is sometimes contained in the hernial sac when it is situated high up near the sternum in consequence of which the tumour is augmented after eating and the digestive process is greatly interrupted.

The disease is produced by natural or præternatural apertures in the parietes of the abdomen; the holes by which blood-vessels pass through the tendons are sometimes unusually large, and a protrusion of the viscera takes place. Sometimes there are deficiencies of tendon at particular places, and sometimes wounds of the abdomen give rise to ventral hernia, the part injured not being properly filled up.

With respect to the treatment, the remarks made on umbilical hernia will suffice, as there is no important difference between the two cases.

CHAPTER XV.

Of Hernia Congenita.

IN the male subject, congenital hernia is formed by a protrusion through the abdominal ring into the tunica vaginalis testis ; it can only happen in those cases where this cavity remains continuous with the general cavity of the abdomen. The protruded viscera are in contact with the testicle, the hernial sac being the tunica vaginalis.

This peculiar species of hernia excited the attention of many anatomists and surgeons about the middle of the last century, among whom Dr. Hunter, Baron Haller, and Mr. Pott, have been very conspicuous, and have described it very accurately.

The differences between hernia congenita, and common inguinal hernia, are of no great practical importance, their symptoms and treatment being nearly similar.

Hernia congenita may be distinguished from common inguinal hernia, by its existence from the period of infancy, and by the impossibility of feeling the testicle, which in common scrotal hernia is very easily distinguished.

In applying trusses in very young subjects, the surgeon should attend particularly to two circumstances, the replacement of all the protruded parts, and the descent of the testicle which might be prevented by the truss.

If an operation become necessary for the relief of a strangulated congenital hernia, the sac should be divided

no lower than the upper end of the testis, a sufficient portion being left to cover that organ.

Mr. Hey, and Mr. Cooper, have each published a curious case of congenital hernia, in which the protruded viscera contained in a hernial sac passed down into the tunica vaginalis testis. In such cases it would be unnecessary and improper to open the hernial sac, the tunica vaginalis being opened the sac and its contents should be reduced together.

A species of congenital hernia may occur in the female, the intestine passing in these cases with the round ligaments of the uterus through the abdominal ring. Its existence could not however be ascertained in the living subject, and no peculiar treatment would be required if it were known.

An opening called by Nuck a "diverticulum," exists in about one of eight or ten female infants, at the abdominal ring, and this diverticulum forms the sac of female hernia congenita; the diverticulum is a small process of peritoneum, passing over the round ligament of the uterus, and terminating in a blind pouch at the groin.

Having described the circumstances and treatment of the most common species of hernia, I refer for those which more rarely occur (and their varieties are very great) to Mr. Astly Cooper, and to Mr. Lawrence. The principal of them are described by the former of these writers in his chapters on PUDENDAL, VAGINAL, PERINEAL, THYROIDEAL, CYSTIC, ISCHIATIC, PHRENIC, MESENTERIC and MESOCOLIC HERNIÆ.

CHAPTER XVI.

Of Hydrocele.

A collection of water within the scrotum, is called Hydrocele. The situation of the fluid varies, and accordingly systematic writers notice several species of hydrocele.

The first of these is the ANASARCOUS TUMOUR OF THE SCROTUM, which most frequently occurs as a symptom of general dropsy, but in some rare cases is produced in the following manner. A hydrocele of the tunica vaginalis testis bursts, and the water escaping into the surrounding cellular texture, forms the anasaruous tumour, which is gradually absorbed, and the aperture healing, the disease resumes its original form, the water being confined within the tunica vaginalis.

The anasaruous hydrocele forms a soft tumour of the scrotum, affecting equally the cellular texture surrounding each testicle. The skin is not reddened or inflamed, but when distended considerably, becomes tense and smooth, its rugæ entirely disappearing. The testicles cannot be felt, they are situated in the middle of the tumour. When pressed with the finger, it has a doughy feel, the indentation remaining some time after the pressure is removed. The skin of the penis is also similarly distended.

The treatment of this complaint differs in nothing from the treatment of general anasarca. The only surgical operation required, is when punctures become necessary for the evacuation of the water. Large incisions are improper, and endanger gangrene. Five or six small

apertures should be made, by inserting the point of a lancet just deep enough to pierce the cutis vera, through these the water flows freely, and the distention of the skin is removed, after which soft dry linen cloths should be applied, and renewed occasionally as they become wet.

In addition to the anasaruous hydrocele, Mr. Pott describes three other species.

First, That which consists of a collection of water, in the cells of the tunica communis, or cellular membrane, enveloping and connecting the spermatic vessels.

Second, That which is formed by the extravasation of a fluid, in the same coat as the former, but which, instead of being diffused through the general cellular structure of it, is confined to one cavity or cyst, in which all the water constituting this species of disease is contained; the rest of the membrane being in its natural state.

Third, That which is produced by the accumulation of a quantity of water, in the cavity of the tunica vaginalis testis.

“These three are distinct, local, and truly within the province of surgery. They may accidentally be combined or connected with other disorders, but not necessarily; and are frequently found in persons whose general habit is good, and who are perfectly free from all other complaints.”

The first species I believe is very rare, and for an account of it I refer to Mr. Pott, it is much more common to find the water collected in one or more cysts upon the spermatic cord.

In the ENCYSTED HYDROCELE OF THE SPERMATIC CORD, the testicles can be felt distinctly at the bottom of the tumour, there is an evident fluctuation of a fluid within the scrotum, and the parts are generally diaphanous. The swelling extends gradually upward, and in some cases probably extends through the abdominal ring, in

which case it resembles hernia, and in one case I have known a truss worn for such a tumour, the surgeon having mistaken the disease for bubonocoele. In the case alluded to Dr. Physick was consulted, and found that, although, as in hernia, the tumour could be nearly pressed up into the abdomen, yet it returned the moment the pressure was removed; the testicle was felt distinctly at the bottom of the tumour, which was diaphanous, and evident fluctuation could be perceived by pressure upon its opposite sides. A puncture was made, and the water was evacuated, after which no tumour remained, and of course no protrusion of the bowels was connected with the hydrocele.

The treatment of hydrocele in those cases where the water is contained in one or more cysts upon the spermatic cord, is to be effected by drawing off the fluid with a lancet or trochar; in young subjects a permanent cure is often effected in this manner. Should the water collect again, it is to be treated by injecting wine into the cyst, in the manner practiced for the cure of hydrocele of the tunica vaginalis.

Mr. Pott recommended a free incision through the coats of the cyst, a severe and dangerous operation which he confesses to have known sometimes followed by the death of the patient; the milder method of injection is certainly to be preferred.

THE HYDROCELE OF THE TUNICA VAGINALIS TESTIS, is that in which the water is collected in the process of the peritoneum which invests the testicle.

The tunica vaginalis, in a natural state, secretes a fluid which lubricates its internal surface and that of the testicle. An increased secretion, or a diminished absorption of this fluid, causes a gradual distention of the cavity in which it is contained, and in some cases the quantity of fluid augments to a very great size.

In some instances the disease forms too suddenly to be thus accounted for. Mr. Else declares, that he has known a hydrocele to form immediately after a sensation in the parts, which the patient ascribed to a rupture of something within the scrotum. In such cases the bursting of a lymphatic vessel probably occasions the disease.

Mr. Ramsden has rendered it extremely probable, that in many instances, hydrocele of the tunica vaginalis is occasioned by the existence of stricture, or local irritation in the urethra.* That this is sometimes the case, has been taught for several years by Dr. Physick, in consequence of his having cured a hydrocele, in a citizen of Philadelphia, by bougies. The bougies being omitted, the stricture returned, and with it a hydrocele, which was a second time cured in the same manner. It is certain however that in very many cases of it, no disease of the urethra exists.

This species of hydrocele occurs at all ages, and is sometimes congenital. The tumour generally forms at the bottom of the scrotum, near one of the testicles, and is commonly confined to one side only; it is pyriform, being larger below than above; it is soft at first but becomes hard and incompressible; it is not inflamed or changed in colour, and is attended with no pain, the principal inconvenience sustained by the patient being from the weight and bulk of the parts. The testicle can be felt at the posterior and inferior parts of the scrotum, until it becomes large and tense. In general, a fluctuation can be perceived, and the tumour is diaphanous.

A careful attention to these symptoms, and to those which characterize other tumours in the scrotum, will effectually discriminate between them.

* *Practical Observations on the Sclerocoele, &c.* London, 1811.

TREATMENT.

The administration of internal remedies has no effect upon this disease, unless employed in a very early stage. The affusion of cold water has been found useful in a few cases, especially in young children, in some instances however the hydrocele of children spontaneously subsides, but the cure is evidently expedited by the cold water. When this remedy is used it should be poured out of a tea-pot, four or five times a day over the scrotum.

Severe purging has, in some instances, occasioned a speedy cure of hydrocele; it very rarely however is found useful, and a surgical operation becomes necessary for the evacuation of the water. The radical cure of hydrocele cannot be effected by merely drawing off the fluid, as it very speedily collects again. In order to prevent this, and finally to cure the patient, it is necessary to excite an inflammation of the tunica vaginalis, and a consequent obliteration of its cavity, by an adhesion of its coats.—This is the general opinion of the manner in which hydrocele is cured, but Mr. Ramsden asserts, that a radical cure may be effected without obliterating the sac. I shall presently quote his words.

OF THE PALLIATIVE CURE.

As hydrocele is by no means a painful disease, many patients prefer submitting to the inconvenience it occasions, to encountering the pain of a surgical operation; by means of a suspensory bag the weight of the tumour is supported, and the excoriation of the neighbouring parts in some degree prevented. When the tumour however acquires a very large size, the inconvenience

resulting from its bulk and weight cannot be obviated by any mechanical contrivance, and the water must be evacuated. The most convenient mode of performing this operation is to insert a common lancet into the tumour in such a situation as to avoid the testicle.* A small trochar may be substituted for the lancet, but it gives more pain. If the lancet be used, a probe, a grooved director, or what is still better, a small canula, should be introduced through the puncture as soon as the lancet is withdrawn; if this be not done, the skin of the scrotum is apt to slip over the puncture in the tunica vaginalis, in such a manner as to prevent the ready escape of the fluid; the aperture through the skin no longer corresponding with that in the sac, the water escapes into the cellular texture, and cannot be evacuated.

After drawing off the water a small piece of adhesive plaster, or a dossil of lint, is to be placed upon the wound, and a suspensory bag applied over the scrotum. In general the wound heals very readily, but in some instances it inflames and suppurates, and effects a radical cure of the disease; this is however not very frequent. Mr. Pott has known the simple operation of tapping a hydrocele, attended with fatal consequences, owing to the peculiarity of the patients constitution.

In some cases the water when once evacuated does not collect again, even though no obliteration of the cavity takes place. This is, however, a very unusual oc-

* In general the testicle is situated at the posterior and inferior part of the tumour; the usual place of drawing off the water is at the middle of the anterior part of the scrotum, but a difference is observed in this respect, and Mr. Hunter recommends to ascertain before inserting the lancet, the precise situation of the testis, which may be done by pressing upon the different parts of the tumour, as a very peculiar sensation is produced by squeezing the testicle. In this way Mr. Hunter once succeeded in drawing off the water of a hydrocele, by inserting the lancet where the testicle is generally found. Several previous attempts having been made by other surgeons, who inserted the trochar at the usual place, where it entered the testicle.

currence, although in recent cases of hydrocele I have known several successive tapplings to effect a radical cure, and this in two or three instances.

OF THE RADICAL CURE.

To produce inflammation and adhesion of the sides of the tunica vaginalis, a variety of operations have been employed. The principal of which are, an extensive incision into the cavity containing the fluid—The excision of the tunica vaginalis—Caustic applied so as to occasion a slough extending through the scrotum into the cavity—The introduction of a tent or seton—Certain external discutient applications—The injection of wine or other stimulating liquors, and the introduction of flour through a small incision into the cavity, after evacuating its contents.

The two latter are most commonly employed at the present time, and I shall not describe any of the others, because they are unnecessarily severe, and have justly gone into disuse.

The method of treating hydrocele by injection has been lately recommended in very strong terms by Sir James Earl. It was first performed I believe by Mr. Lambert, a French surgeon, who injected a solution of corrosive sublimate in lime water. A variety of other fluids have been tried, but the best is believed by Sir James Earl, and by the generality of surgeons to be wine. It is sufficiently irritating to effect the purpose, and not so irritating as to occasion unpleasant effects.

Sir James Earl recommends about two thirds of wine (common port wine) to one third of water. If the parts appear insensible and no pain is produced, he recommends, to add to the proportion of wine. If on the contrary the pain be very great, especially in recent cases, the proportion of water should be increased.

Mr. Ramsden although he advocates the operation of Sir James Earl, insists that the obliteration of the sac does not in all cases succeed it. He remarks, "I am ready to allow that when inflammation is induced to a certain extent, the annihilation of the cavity of the tunica vaginalis will be a necessary consequence; but I know also that the radical cure of the hydrocele may be effected (and is so in a large majority of cases) by excitement of that sacculus without any such extinction of its cavity." His theory is, that inflammation induces a suppression of the action of the secretory vessels which pour out the fluid, even when the degree of inflammation is insufficient to produce adhesions, and consequent obliteration of the cavity.

It has been recommended by Mr. Pott, in every case previously to performing any operation for the radical cure of hydrocele to draw off the water, in order to examine the testicle and ascertain whether it be diseased or sound. Sir James Earl urges another reason for this, which is that the size of the tumour may in this way be considerably diminished, and therefore the operation for the radical cure will be less severe. He considers the remark as chiefly applicable to large hydroceles; when the tumour is of a smaller size, the previous tapping is unnecessary.

The usual method of performing the operation is to seat the patient upon a chair, and to tap the tumour with a trochar at the anterior part a little below the middle, care being taken to avoid the testicle and any large vein, of which a great many are commonly visible in the scrotum—when the whole of the water has flowed through the canula of the trochar, a syringe or bladder and pipe, which fit the canula are to be employed, and the cavity distended with the wine and water to its former dimensions. This fluid is to remain till considerable pain in the back and loins is perceived. In general, this pain

is very severe in five or six minutes, but it is sometimes necessary to keep it in longer, and sometimes it cannot be borne so long. I have known fainting ensue, and immediately on injecting the wine the patient has dropped from his chair. When the wine has been suffered to remain a sufficient length of time in the sac, it is allowed to pass off again through the canula, and the patient is placed in bed.

The subsequent treatment consists in regulating the degree of inflammation; if it be very severe bleeding and purges, with a low diet are to be prescribed, and if on the contrary too moderate, an opposite plan is to be pursued, and a generous diet and wine are to be directed.

The only cautions necessary in performing the operation are to be certain that the canula is within the tunica vaginalis when the wine is injected, and to avoid irritating the testicle by the trochar or lancet, and also by moving the end of the canula so as to rub its surface.

In order to prevent the canula from slipping out of the cavity, it should be inserted upwards to a considerable distance, and held in the same situation during the operation by pressing it between the fingers which are to enclose also the skin of the scrotum at the part where it entered so that the scrotum may be pinched between the finger and the canula. From a neglect of this precaution the cellular texture of the scrotum has been injected instead of the tunica vaginalis, and extensive mortification has been the consequence.

This operation by far the mildest which has been found successful, does not invariably succeed, and this is a good reason for rejecting a modification of it lately proposed, by substituting warm water for wine.* I have

* I have seen this plan proposed in a late European publication, but I am unable to recollect with certainty by whom it was suggested, I think by Mr. Wheatly.

known one case in which this practice succeeded, but certainly the wine is preferable because more stimulating, and because its degree of stimulation can be varied according to circumstances. In a large majority of instances the injection of wine will be found to effect the cure. If it should however fail, it can be repeated, or Mr. Hunter's operation may be substituted.

This consists in making an incision an inch in length, into the tunica vaginalis at the anterior part of the scrotum, evacuating the water, and filling the cavity with balls of dough, the aperture being held open by two hooks in the hands of an assistant. The patient being placed in bed generally a good deal of pain and fever supervene; suppuration takes place, and the flour is washed out with the pus. The cavity gradually contracts, and granulations form, which uniting, completely fill it up.

This is a most certain and effectual cure for hydrocele, and although more severe than the injection, is by no means comparable in severity to the incision, seton, or caustic, formerly employed. I have seen it performed in several instances, always with success and without any very distressing consequences.

CONGENITAL HYDROCELE is that species of the disease in which the tunica vaginalis retains a communication with the general cavity of the abdomen. Desault in these cases injected red wine, making pressure at the abdominal ring to prevent its entering the abdomen. He was successful, and never occasioned peritoneal inflammation. In one instance in which it was connected with congenital hernia, he performed the operation, the tunica vaginalis was obliterated, and both hernia and hydrocele were radically cured.

The principal chronic enlargements of the testicle which are called by the general name of SARCOCELE

have been briefly noticed in the chapter on cancer. is proper to state in this place, however, that these enlargements often accompany hydrocele, and in many cases forbid the use of any of the remedies proper for the radical cure of the latter disease. In these cases (which are denominated hydro-sarcocele) frequent evacuation of the fluid is the safest and best mode of treatment.

As I shall not treat of any of the forms of venereal disease in the present work, I cannot enter on the consideration of HERNIA HUMORALIS, or swelled testicle, resulting from gonorrhœa. It may not, however, be improper to state that the repeated introduction of bougies is frequently found successful in reducing enlargements of the testicle which have originated from this source, even in cases where they appear to exist independently of strictures in the urethra.

In all obstinate cases of sarcocele which resist the usual discutient remedies and become painful it is the safest plan to remove the affected part.

CHAPTER XVII.

Of Hæmatocele.

THIS term has been used by surgeons to express those swellings of the scrotum which are occasioned by effused blood. The blood may be situated in the common cellular texture of the scrotum differing in no respect from common ecchymosis; or it may be situated in the tunica vaginalis. Ecchymosis in the substance of the testis, constitutes another species of hæmatocele.

The cause of this affection is a rupture or puncture of a blood-vessel, and the remedies are such as promote the absorption of the effused blood—the treatment is similar to that employed in cases of ecchymosis; cold applications, moderate pressure, and occasional purging.

It sometimes happens that a large quantity of blood is collected in the tunica vaginalis, after the tapping of a hydrocele; this blood should be evacuated by a puncture, and the scrotum supported in a suspensory bag. I have known the whole scrotum suddenly become distended with effused blood from the rupture of the tunica vaginalis, in a case of hydrocele. The patient and his surgeon in this case were greatly alarmed by the new appearance of the parts, which became tense, and assumed a dark purple colour, indicative, as they supposed, of gangrene. No such consequence however followed. The encysted became an anasaruous hydrocele, the water mixed with extravasated blood was diffused through the cellular texture of the scrotum; in a few days the aperture through which it had escaped, healed up, and the parts resumed their usual appearance; the encysted hydrocele returning, the extravasated blood and water were absorbed.

CHAPTER XVIII.

*Of Varicocele and Circocoele.**

VARICOCELE consists in a varicose or morbidly dilated state of the veins in the scrotum. In general this is the consequence of other diseases of the neighbouring parts, and these are the chief objects of attention, as the enlargement of the veins occasions no particular inconvenience.

CIRCOCELE is a varicose state of the spermatic veins. It occurs in a great majority of cases in the spermatic cord and testicle of the left side, in consequence, as Mr. Home supposes, of the circuitous route which the blood of the left testicle pursues, in its return to the vena cava; the spermatic vein commonly terminating at a right angle in the left emulgent. It sometimes occasions a diminution of the testicle. The tumour occasioned by this distention, is sometimes very considerable; it is generally greatest at the lower part near the testicles. The disease has sometimes been mistaken for omental hernia, but it may always be distinguished in the manner proposed by Mr. Astly Cooper; he directs the patient to be placed in a horizontal posture, and the veins to be emptied by pressure, after which the surgeon is to place his fingers on the upper part of the abdominal ring, and desire the patient to rise. If the disease be hernia, no return of the tumour can take place whilst the pressure is continued, whereas this pressure, encreases the swell-

* These terms are often promiscuously used, but they may very properly be applied with more precision to express two very distinct morbid affections. Celsus and after him the classical Mr. Percival Pott applied the term circocoele in the sense which I have adopted.

ling in cases of circocoele, by interrupting the passage of the blood through the veins. In addition to this we are generally able to feel distinctly, in cases of circocoele, the round figure of the convoluted vessels at the top of the testicle.

In general the disease occasions but little inconvenience, and the patient is not anxious for a cure ; but when distention is very great and the weight of the tumour considerable, severe pain in the back and loins are the consequence.

In the treatment of this complaint, a radical cure is seldom attempted. A suspensory bag is generally recommended, and the old remedy of castration which has been too often performed for the cure of circocoele, is now justly disused.

Mr. Home has tied up the spermatic vein for the cure of this disease, but the symptoms consequent were exceedingly severe, and unless in cases of enormous distention of the veins, the operation ought not to be performed.

CHAPTER XIX.

Of Strictures in the Urethra.

A stricture of the urethra consists in a contraction, or diminution of diameter in a part of this canal. It is either spasmodic and temporary, or permanent.

The SPASMODIC STRICTURE consists in a contraction of the urethra at a particular part, depending upon spasm, and subsiding when that spasm ceases.

The PERMANENT STRICTURE is attended with a change in the structure of some part of the urethra, generally in the first instance a very small part, not more than would be forced together by a pack thread tied on the outside of the canal. The two cases are occasionally blended, and spasm supervenes upon a permanent stricture.

Strictures in their commencement are in general spasmodic, and Mr. Hunter and Mr. Home consider them in the first stage, as a wrong action of the muscular fibres of the urethra, which at times completely subsides, and leaves the parts unchanged. As the disease progresses the canal at the affected part loses the power of expanding again to its original diameter, and thus becomes permanently contracted.

Permanent strictures are generally liable to spasm, as we find patients affected with them, frequently suffering a complete suppression of urine, in consequence of exposure to cold, or the intemperate use of wine, of violent exercise, or similar causes of an irritating nature.

Mr. Charles Bell in a recent work on the diseases of the urethra, denies that the urethra "is muscular or ca-

pable of contracting, and consequently declares Mr. Hunter's opinion of the origin and nature of strictures in the urethra to be unfounded. He has endeavoured to prove that the membrane of the urethra is destitute of muscular fibres by experiment:—having introduced an ivory ball into the urethra, he directed the man who was the subject of the experiment to expel it, which he was unable to do. He imbedded the ball with stimulating articles as soap and spirits, but still there was no power in the urethra to retain the ball or to push it forth. The ball could only be expelled by the urine behind it, or by the ejaculator seminis. An experiment was made to ascertain the action of the urethra upon fluids. Mr. Bell found that when the urethra was distended with water to a distance of five inches from its external orifice, the patient was utterly unable to empty it by any effort of the parts.

Mr. Bell's experiments do not appear to me by any means to establish the point: because the urethra is evidently capable of emptying itself, a fact which is readily proved by distending it with urine, keeping the external orifice closed; if at this time a finger be placed in such a manner as to compress the urethra three or four inches from the end of the penis, and the orifice of the urethra be now opened, a jet of urine takes place, and that part of the urethra is emptied. It is evident in this case that the urine from the bladder being intercepted, nothing but the contraction of the urethra could evacuate its contents.

Mr. Bell is right, however, in ascribing much to inflammation, in the formation of stricture, but when he asserts that the sole origin of all strictures in the urethra is inflammation, he goes too far.

Wishing to avoid all controversy on this, as on all other occasions, I pass over many arguments which might be advanced to prove the contractile power of

a stricture in the urethra, but of the fact I think few surgeons who are conversant with the subject will entertain a doubt. It often happens in practice that a stricture which commonly admits a large bougie shall suddenly deny to the efforts of the surgeon a passage to *every instrument*. After a time this temporary barrier ceases as suddenly as it came on, and again the large bougie gains a ready entrance. The change is too sudden to be ascribed to inflammation; it must be owing to spasm. Every surgeon of experience must have seen bougies expelled the urethra by the action of this canal.

This progress of a stricture of the urethra is in general very slow at first; I have known a person insensible of its existence even when the stream of urine was reduced to one fourth its natural size, so gradual and slow had been its increase. After a time, however, it advances more rapidly. The urine is voided very frequently, and great efforts of the bladder are required to pass it; it comes out in a spiral or forked stream, and a tenesmus urinæ or straining continues after this viscus is emptied.

When the stricture is in this state, a debauch with wine; exposure to cold; and a variety of other occasional irritations aggravate the disease, and sometimes occasion a suppression of urine. Mr. Home ascribes this to a closure of the urethra at the strictured part by spasm, and I think it gives great plausibility to his opinion, that the remedies most successful in removing the complaint are such as are generally employed in the treatment of spasmodic diseases, as opium, the warm bath, &c.

Strictures are very often attended with a discharge from the urethra; a dull heavy pain in the back and loins attends the complaint, and many of the symptoms of stone are occasionally experienced.

The bladder is sometimes greatly thickened in consequence of strictures. Sometimes it inflames and dis-

charges mucus and pus; in some instances a discharge takes place of a whitish adhesive viscid substance, which Mr. Home pronounces to be a vitiated secretion of the prostrate gland, an opinion founded upon dissections.

In some patients a nocturnal emission of semen attends, and in others the discharge of semen is prevented by the obstruction. The urine is often turbid, depositing a sandy sediment.

All the symptoms of stricture, are greatly aggravated by accidental circumstances of an irritating nature, especially by exposure to cold. In some rare instances peritoneal inflammation and death have resulted from strictures of the urethra.

If the stricture be suffered to go on without any interruption from the surgeon, it sometimes produces a complete obliteration of the urethra, and suppuration takes place behind it, forming an abscess which opens through the external teguments, and a passage is thus formed for the escape of the urine forming a FISTULA IN PERINEO.

Fevers and shiverings frequently attend the progress of strictures, accompanied with nausea, vomiting and indigestion. In some cases these symptoms come on in consequence of the introduction of bougies, or of other irritation.

The appearance of strictures on dissection vary very much. They sometimes occupy only a small portion of the urethra, and at other times an inch or more of its length is found irregularly contracted, forming a winding canal. Sometimes the appearance is that of a mere narrowing of the canal, and in other cases a complete ridge projects into the urethra. The bladder after death is found greatly thickened, and sometimes the ureters and kidneys are diseased.

In some cases one, and in some several strictures exist. Mr. Hunter has known six in one urethra.

The most frequent situation of stricture is at the bulb ; Mr. Hunter says he has never seen a stricture at the prostrate gland, but they occasionally form in every other part of the canal. Mr. Home thinks the order of frequency greatest at six and a half or seven inches from the external orifice, that is at the bulb of the urethra ; and next about four and a half inches. I have seen the very extremity of the canal affected with stricture.

The causes of stricture in the urethra, are not very well understood. Sometimes they result from irritation, and probably from gonorrhœa and the use of irritating injections, although Mr. Hunter doubted whether these were frequent sources of the disease. Mr. Andrews relates a case where it appeared to result from the gravel, in a child between five and six years of age.* Mr. Hunter has seen a stricture in a boy only four years old, and I have recently dissected a young man aged about nineteen, who from infancy had been afflicted with a stricture of the urethra, his bladder for some time before his death, was not capable of holding more than two ounces of urine, and its coats were found more than half an inch in thickness. In general they occur without any evident cause, although as most men have had at some period of their lives, the venereal disease, they generally ascribe their strictures to this source.

TREATMENT.

The methods of treating strictures of the urethra in general use, are two ; the dilatation by means of bougies, and the destruction of the stricture with caustic. Dr. Physick has contrived another plan, and in some instances, has cut through the stricture.

The introduction of bougies to dilate the stricture, although considered by Mr. Hunter, as affording only a

* Andrews on Strictures, p. 8.

temporary relief, succeeds no doubt in curing completely a great many cases of this complaint. The manner in which bougies act upon the stricture, is not simply by dilating mechanically the contracted passage, but by pressure they produce ulceration, and the stricture is destroyed by the absorbents.

In this country it is essential for the surgeon to be acquainted with the manner of preparing bougies, because those which are imported and manufactured for sale are very unsafe, and are totally unfit for the purpose for which they are designed. They are unsafe because being formed generally of old linen they are apt to break, and in this manner may lodge in the bladder or urethra, and occasion great inconvenience, and they are unfit for use, from their bad form, and from the improper substances of which they are composed.

The best materials for the construction of bougies are fine new linen and pure yellow bees wax. The linen should be cut into pieces about twelve or fourteen inches square, and dipped into melted wax; it should be taken out in such a manner that the wax may drip off at one end, and not more by one corner than another; in this manner the linen will receive a coat of wax of a uniform degree of thickness, excepting that the depending portion will be more thickly coated than the superior part; the linen is to be cut into strips of a proper width, care being taken always to cut in the transverse direction, because as there is more wax upon the lower than the upper part, there would be an irregularity in the form of the instrument if this caution were neglected. The strip of waxed linen or bougie plaster is next to be cut of a proper shape, so that when rolled up it may taper to a point. The form which I prefer, is to have the bougie slightly conical, through its whole length, but to taper at the end, very quickly to a point. The smallness of the point enables the surgeon to insinuate it into

the stricture and the conical form gives it a degree of firmness gradually increasing from the point to the opposite extremity. The art of rolling up the bougie and of giving it a proper point is to be acquired by habit, and need not be particularly described. I will only remark, that a marble slab, or a polished mahogany table, and a broad spatula, or knife, are all the tools necessary for this purpose, and I conclude this part of the subject by recommending to the practitioners of this country the preparation of their own bougies.

Previously to their introduction they should always be covered with sweet oil.

In order to ascertain the existence of a stricture in the urethra, it is necessary to pass a large bougie with a round extremity along the urethra; the place at which it stops marks the situation of the stricture. A large bougie passes more readily than a small one as far as the stricture, because the point of a small bougie is apt to get entangled in the lacunæ of the urethra. Mr. Charles Bell recommends for this purpose a ball or globe of silver soldered upon a long probe. It has no advantage, however, over the common bougie.

In passing a bougie, care should be taken to avoid pressing any part of the urethra, and the penis should be drawn forwards upon the bougie at the same time that the bougie is pushed gently on.

It often happens that when the surgeon is first consulted, he finds the passage so small that no bougie can be passed through the stricture. In these cases it should be daily introduced down to the stricture and pressed against it with moderate force; after repeated trials of this kind, the bougie will generally gain an entrance, and if even the smallest bougie be once passed through the stricture it can always be dilated so as to admit a larger one. The pressure should never be great, be-

cause a false passage might be formed by too much violence.

The attempt to introduce a bougie often excites spasm in the stricture, and this retards and sometimes prevents the introduction of the instrument. Mr. Hunter advises in such cases to press the bougie gently against the stricture for a few minutes, when in general the spasm will subside.

The bougie when first introduced should not be suffered to remain long; after three or four minutes it should be removed. Its introduction should be repeated daily, and the time of its continuance gradually increased; it may at length be suffered to remain an hour or longer. The diameter of the bougie should also be augmented from time to time, until the strictured passage is dilated to its natural size.

The use of the bougie should not however be entirely discontinued even when this is done, because the parts retain for a long time a disposition to contract, and this must be obviated by an occasional introduction of the instrument; once in three or four weeks will be often enough for this purpose.

Patients sometimes faint and become sick, and covered with a cold sweat, when a bougie is first used, this however seldom occurs at the subsequent introductions.

It often happens that bougies are completely inefficient in the treatment of strictures, and a long and steady perseverance in their use, produces very little if any dilatation of the diseased part. In such cases, and in all those cases in which the bougie cannot be introduced, and the passage is almost or entirely closed, the destruction of the stricture must be effected either by caustic or the lancet.

The application of caustic was introduced by Mr. Hunter. Mr. Home has written extensively upon the

subject, and extols very highly this method of treating strictures.

The best mode of applying the caustic I believe to be that recommended by Mr. Home: a bougie is to be prepared of a size which will pass readily down to the stricture; into the end of this bougie a piece of lunar caustic (*argentum nitratum*) is to be fastened; it is covered laterally by the bougie plaster, and is uncovered only at the extremity of the instrument. For the purpose of security I have always tied a fine cambric thread neatly round the linen which invests the caustic.*

The bougie thus *armed* is ready for use;—the distance to which it is to be passed in the urethra is ascertained by passing another bougie down to the stricture, and marking upon the armed bougie the depth to which it had entered when in contact with the stricture. The armed bougie is now to be dipped into oil, and passed down to the stricture, it produces no irritation and indeed scarcely touches the urethra until it arrives at the stricture. The caustic should be suffered to remain in contact with the stricture about a minute, and should be then withdrawn. The pain experienced is generally very slight, and the consequences by no means severe. The patient should be directed to make water after the removal of the armed bougie. A little blood will sometimes be found to tinge the urine voided. The application is to be repeated once in forty-eight-hours, as often as may be necessary for the cure of the disease. It is seldom safe to use the caustic oftener, but in some cases where the sensibility of the parts is very much diminished, Mr. Home has applied it every day.

Mr. Whately has introduced a mode of destroying

* The caustic should be nearly half an inch in length, and of about one-third of the thickness of the usual rolls of caustic. It is not easy to procure it of this shape, and the surgeon must either scrape it thin enough, or fuse the common lunar caustic and cast it in an iron mould.

strictures by the application of the vegetable caustic alkali. A piece of kali purum as large as a pin's head, he directs to be placed in an indentation made by the nail in the end of a bougie, and this bougie is to be passed down to the stricture. The caustic dissolves very speedily in the fluids of the urethra, and thus destroys any part of the canal with which it comes in contact. For a particular account of this plan, I refer to Mr. Whately's publication, just observing, that it is, in my opinion, a most uncertain mode of operating, as it is impossible to know on what part the caustic will dissolve, and as Mr. Charles Bell remarks, it will be much more likely to act on the hollows and depressions in the urethra, than on any natural or accidental eminences.

Mr. C. Bell has constructed an instrument for the application of caustic to strictures, which consists of a hollow globe with an aperture at the end, or side, fastened on a long probe. A portion of alkaline or lunar caustic placed in this aperture may be passed down to the stricture, but the mode of applying caustic recommended by Mr. Home I believe to be preferable to any other method.

The division of a stricture by means of a cutting instrument, was first performed by Dr. Physick in 1795, and in several instances since that time, he has repeated the operation with success. The instrument employed for this purpose is a lancet, concealed in a canula; when the stricture is situated anteriorly to the bulb of the urethra, no danger or difficulty attends the division of it by means of this instrument, but if the stricture be situated at the bulb, a very accurate knowledge of the anatomy of the parts will be necessary, and great caution in the operation. A small wound however of the urethra, made with a sharp lancet, would occasion no great trouble, and would probably heal very readily. The urethra is generally distended behind the

stricture, and of course it is not easy to pass the knife in a wrong direction. After the stricture is cut through, a flexible catheter should be introduced and kept in the bladder three or four weeks ; after it is removed a bougie should be frequently introduced.

The best method of treating SPASMODIC STRICTURE with a view to a radical cure consists in applying caustic to the part. During the continuance of the spasm, bleeding, mercurial purges, opium, and the warm bath will be found useful. Emetics are also occasionally successful. Dr. Shaw of this city, succeeded in procuring relaxation of a spasmodic stricture by passing on a bougie a leaf of tobacco down to the stricture. Nauseating medicines are very advantageous.

Within a few years many volumes have been written on strictures of the urethra. Several of these are highly valuable, among the rest I beg leave to refer the reader to the writings of Mr. Hunter, and to the excellent history which Mr. Home has given of this subject. Mr. Whately, Mr. Charles Bell, and Mr. Andrews have also written papers which contain very useful information.

With respect to the mischievous effects said to have resulted from the use of caustic, I have no doubt that in many instances they have occurred, and the indiscriminate use of caustic is therefore wrong. Where the stricture yields readily to bougies, they ought to be preferred. Where it does not, the caustic should be substituted, and if managed with proper caution, is I believe very generally safe, though I have often known suppression of urine occasioned by it, and in one case a hemorrhage which reduced the patient to extreme debility, from which he never recovered.

CHAPTER XX.

Of Fistula in Perineo.

IN consequence of an entire stoppage or great obstruction to the discharge of urine from a stricture in the urethra, inflammation and ulceration take place behind the strictured part; when the ulceration proceeds through the skin forming an outlet for the urine, the disease called fistula in perineo is formed.

The same circumstance also results in some cases from accidental injuries to the perineum which terminate in ulceration communicating with the urethra.

The urine in some cases becomes extravasated into the cellular texture in the vicinity of the urethra, and occasions violent inflammation and mortification. When the sloughs separate if the patient survive, a fistulous ulcer remains.

The first thing generally necessary in the treatment of fistula in perineo, is to dilate and remove the stricture which caused it. A bougie should be passed, and in many cases it will find a ready access to the bladder, the stricture having been destroyed by the ulceration. If, however, the stricture remain, an opening should be made through it by the use of caustic, and an elastic catheter introduced and kept in the bladder until the external sore heals, which will generally happen speedily in recent cases.

In many instances, however, the fistula is by no means so readily cured—the urine escaping into various parts of the cellular texture of the scrotum produces abscesses and sinuses running in various directions. The integu-

ments of the perineum and scrotum, are knotty, hard, and irregular, with one or more outlets for the urine.

The cure in these cases is often difficult; sometimes impracticable. It should be attempted, however, by destroying the stricture in the way already mentioned, and if this fails, by making a free opening externally into the urethra, in order to prevent the urine from entering the sinuses. The best method of doing this is to pass a silver female catheter, sound, or director, down to the stricture, and to make this project as much as possible in the perineum. A probe should now be passed into the fistula and the catheter sought for. If it can be felt (which is not always the case) an incision should be made down upon it, and this incision should be carried farther towards the bladder so as to open the urethra freely between the stricture and the bladder; but if the catheter cannot be felt by the probe passed into the fistula, then an incision is to be made directly upon the extremity of the staff or catheter, and the stricture will in this manner be cut through. A catheter should now if possible be passed into the bladder; if this be not practicable, and the surgeon be unable to find the urethra behind the stricture which is often extremely difficult, in such a case it has been recommended to perform a more decisive operation.

Mr. Charles Bell on this subject remarks: "It often happens that in these diseases of the perineum, the urine obtaining a free discharge by the fistulous opening, the original stricture is more and more contracted, and a considerable part of the canal is totally obliterated. This contraction and increase of the length of the stricture is no doubt accelerated by the successive extension of the inflammation in the perineum; and very often in this complicated state of the disease, there is a large quaggy swelling of the integuments of the perineum, great part of which it were better to take

away by a double incision in the first part of the operation.

“In this operation, one longitudinal incision in the length of the diseased integuments of the perineum, or two, including a portion of the diseased skin, may be necessary. In this the state of the parts must be our rule and guide.

“Now the parts are to be pretty freely dissected, while we endeavour to make distinct the bulb of the urethra. The fistulous opening into the urethra is next to be sought for; and a staff, or sound, or catheter, having been introduced into the urethra, down to the upper part of the stricture, the track of the diseased urethra, and the point of the staff is to be explored; and if the urethra proves entirely diseased for some length, it is to be cut out. Now a bougie of the largest size is to be introduced from the wound, into the bladder, and another from the extremity of the urethra down to the wound. The parts are to be slightly dressed, and the patient put to bed.

“After a few days, when suppuration has taken place, and the granulations are sprouting up about the bougie, it is to be withdrawn, and the catheter introduced along the whole length of the urethra; over which, if it be kept steady, and in a good situation, the parts will soon heal.

“After the first dressing, when we find that the inflammation is not likely to run to any dangerous degree, we must dress it with a stimulating ointment, on slips of lint, and over this put a warm poultice, which will promote healthy granulations.”

The fistulous ulcer is in some cases so indolent as to require the most stimulating applications to induce granulations. In such cases caustics and escharotics are to be used. I have tried the hare-lip suture in a case of large opening into the urethra at the perineum, but no

advantage resulted, although the urine flowed entirely through an elastic catheter, and not a drop escaped at the wound, the edges of which had been pared off and kept in contact. This backwardness to granulate and heal, depends therefore not only on the escape of urine at the ulcer, but also on the change of structure in the part, which is very great; all appearance of corpus spongiosum being in most cases lost, and succeeded by an indurated indolent substance.

Fistulæ in perineo sometimes contract to a very small size and appear to heal, and yet remain open, occasionally discharging urine during a number of years. I have had several patients with fistulæ too small to admit the finest probe, and these fistulæ have remained open during life.

Fistulæ sometimes result from false passages formed by the improper use of the bougies used in treating strictures. For an account of this subject I refer to Mr. Hunter.

CHAPTER XXI.

Of Retention of Urine.

A total obstruction to the discharge of urine situated at the neck of the bladder, or in the course of the urethra, is the most usual cause of a retention of urine, but it sometimes results from a paralytic state of the bladder, and a consequent inability to expel its contents. As the latter is not strictly a surgical complaint, and as the introduction of the catheter is easily effected, it will only be necessary to treat of the former.

When the sensation of a full bladder is perceived, if the patient be unable to evacuate his urine, great pain and violent straining efforts come on, the bladder gradually distends, and may be felt above the pubis, and swells in some cases so much that its fundus rises to the umbilicus. The abdomen swells and becomes tense and painful, hiccough, difficulty of breathing and cold sweats attend, the bladder inflames, and unless relief be obtained mortification follows.

The causes by which the discharge of urine is prevented are various: inflammatory, and other swellings in the vicinity of the urethra, as hemorrhoidal tumours, abscesses, &c.—a stone in the bladder or urethra;—spasm at the neck of the bladder or in the urethra;—a permanent stricture, with or without spasm;—inflammation of the neck of the bladder;—an enlargement of the prostate glands, &c.

Retention of urine unless relieved, terminates in general by death; but in some cases this event is protracted very much. Where the obstruction does not entirely

close the urethra, urine after a time begins to flow off, and although the bladder remains very greatly distended, yet the partial evacuation prevents the fatal consequences of the distention, and the patient continues in this situation sometimes for several weeks making water as the French express it "*par regorgement*."

If the discharge, however, be totally precluded, still death is not absolutely inevitable, because mortification may take place in a particular spot without proceeding to any considerable extent. At this mortified part the urine escapes, and most generally the part which mortifies first is situated in the vicinity of the neck of the bladder, so that the urine becomes extravasated into the neighbouring cellular texture, and fistula in perineo is the consequence. Sometimes the mortification is seated at the posterior part of the bladder and extends through the coats of the rectum, and the urine is suddenly in consequence of this, evacuated per anum. Instances have occurred in which the bladder has burst (mortification having probably preceded) at its anterior part, and the urine has been discharged by an abscess at the umbilicus. In other instances the urine escapes into the cavity of the abdomen and produces death.

The ureters and kidneys become affected in consequence of the interruption to the discharge of urine, and they swell very much and become distended with this fluid.

TREATMENT OF RETENTION OF URINE.

This depends greatly upon the cause of the evil. If a stone in the bladder have interrupted the discharge of urine by falling over the neck of the bladder, a change of posture will generally relieve the symptom. If a small calculus be lodged in any part of the urethra, this should be extracted by means of an eyed probe bent at its per-

forated extremity into a hook, or by means of long forceps concealed in a canula (an instrument employed for that purpose by Mr. Hunter,) or lastly, by cutting down upon the stone and removing it through the wound.

The most frequent obstruction, however, in the urethra is a stricture, either in a state of inflammation, or affected with spasm.

To ascertain the state of the canal it is best to introduce a bougie. In some instances this succeeds, and the urine flows as soon as the instrument is retracted, though it had not entered the bladder, but simply dilated the stricture. Should this fail, an elastic catheter should be introduced and passed as far as it will go without force; should it enter the bladder, the urine is evacuated through it.

At the time that these efforts are made, the patient should be freely bled, a mercurial cathartic should be taken, and he should be placed in a warm bath. Emetics and nauseating medicines have in some cases succeeded in relieving a suppression of urine. Opium in considerable doses is to be next given if these remedies fail. It may be administered by clyster, or by the mouth. It has been recommended by Mr. Weldon to administer tobacco in infusion, perhaps its local application to the urethra and neighbouring parts would in some cases succeed.

The great reliance of the surgeon, however, in all cases of retention of urine is upon the catheter, and the introduction of this instrument is an object of immense importance to the safety of the patient, and of proportionate interest to the surgeon. I know no disease in the treatment of which dexterity and science are more essential than in the present, and there are very few in which more mistakes have been committed, or where the consequences of deficiency in the skill or knowledge of a practitioner are more serious, and fatal. In the inte-

rior of our country there is reason to believe that many valuable lives are annually lost from no other cause than a want of proper medical assistance in cases of retention of the urine.

Catheters are tubes adapted to the purpose of drawing off urine. Until within a few years they were generally made of silver, and of course were incapable of altering their shape when passed into the urethra; the importance of flexibility in this instrument induced the older surgeons to construct catheters of silver wire rolled in a spiral form, and polished smoothly on its external surface. Of late years a flexible metallic compound consisting chiefly of tin has been formed into catheters, some of which possess great flexibility. A French family of the name of Bernard, are in possession, however, of a composition for the construction of catheters far preferable to every other hitherto in use. The instruments prepared by Bernard have been supposed to consist of elastic gum. I do not myself believe that much if any elastic gum exists in the catheters manufactured by Bernard, because I have seen catheters made of elastic gum and they had no resemblance to those of Bernard; they were useless from their too great flexibility. A web of silk forms the basis of the instrument, and this silk is varnished with a peculiar secret composition, which when dry is hard and susceptible of a fine polish, and the instrument remains in the urethra a week or ten days without producing much irritation, and without becoming rough or being in any degree dissolved—properties as I believe, peculiar to the French catheters, the best of which are those prepared by Bernard.*

A great many catheters have been made in imitation of the French. Those made in England are much more

* It is singular that Mr. Charles Bell should declare at the present day, that "in the hands of a dexterous surgeon the silver catheter is in general preferable to every other;"—The surgeon who uses it should be also a "dexterous" silversmith.

highly finished, and for the mere purpose of drawing off the urine they answer extremely well, but when left in the urethra they become rough, and finally dissolve in the urine and mucus.

Dr. Physick has made a great number of experiments with a view of discovering some composition possessing the requisite flexibility, and remaining insoluble in urine. A cylindrical silk web, wove by the whip makers upon wire of different sizes may be readily coated with varnish, and when dried is easily formed into a catheter. Copal varnish may be used for this purpose, and a catheter well adapted for drawing off urine can be made without difficulty; the surface being polished by rubbing it with pumice stone. This instrument, however, Dr. Physick found becomes speedily rough when allowed to remain in the urethra, and no other composition which he used possessed the properties combined in the French catheters, nor have the labours of others been more successful, for though very numerous attempts have been made to contrive a substitute for this instrument they have all failed.

I shall dilate upon this subject no farther than to mention a mode of preparing an extemporaneous catheter which under certain circumstances, may prove a very useful instrument to the country practitioner. It consists in regularly extending the spiral wire of the suspenders which form at this time an article of every gentleman's dress till it becomes of sufficient length. This wire is afterwards to be covered with bougie plaster, and a hole cut near the end; being properly rolled and prepared like a bougie it forms a very tolerable catheter. Dr. Physick in a case of emergency where no other catheter was to be procured, contrived this instrument, and on a similar occasion I have once found it extremely useful. I find, however, that Mr. Daran was in the habit many years ago of preparing a catheter somewhat in the same

manner, by enveloping one of the old catheters formed of spiral silver wire in bougie plaster.

It is difficult to give any general rules for the introduction of the catheter. When the flexible catheter is used, it is only necessary to pass it gently onward drawing the penis at the same time forward. When this fails, and the stilet of wire is introduced in order to give to the instrument a greater degree of firmness, which is often necessary, then great caution must be used to avoid forming a wrong passage, by lacerating the urethra. Much is to be done by varying the form of the instrument. I have myself been accustomed when attempting to pass the catheter, to provide a great number of wires curved in different forms, and when one has failed I have without delay substituted another; it is astonishing how greatly the success of the operation will in some cases be influenced by a slight alteration in the shape of the stilet. In addition to the usual curve of the stylets I have found great advantages from different lateral curvatures near the point of the instrument. In general no great difficulty is experienced in passing the catheter through the anterior part of the urethra, the greatest difficulty is at the bulb of the urethra, or at the prostate gland, or neck of the bladder. It is probably of no great consequence whether the instrument be passed with the convexity towards the abdomen, or towards the perineum, it is at all events very easy when one fails to try the other. If the operation fail in an erect posture, it should be tried in a recumbent one, and vice versa; Mr. Hey prefers the recumbent position and in most instances it is as convenient as any and in old or debilitated patients should be preferred.

The common obstacle to the passage of the catheter in that part of the urethra which is anterior to the prostate gland is a stricture, and the mode of treating this has been already detailed. A difficulty often arises from the

enlargement either chronic or inflammatory of the prostate gland ; to surmount this obstacle the catheter should be curved very much at the point, even more than has been recommended by Mr. Hey ; *much more* than is recommended by Mr. Charles Bell.

In the succeeding plate I have drawn the shape of a catheter which I succeeded in introducing into the bladder of an old gentleman with an enlarged prostate, after being baffled in every other attempt ; it is perhaps as much bent as will in any case be found requisite, and yet not more so than in certain instances will be required.

Mr. Hey accidentally discovered a mode of increasing the curvature of the flexible catheter by retracting the stilet whilst in the urethra, a practice long used and for many years taught by Dr. Physick, and which in some cases is very successful, by elevating the point of the instrument above the prostate gland.

As the chronic enlargement of the prostate in old persons is one of the most important and frequent cases which calls for the introduction of the catheter, I shall mention under the present division of the subject a mode of relieving retention of urine which sometimes succeeds when most others have been tried in vain.

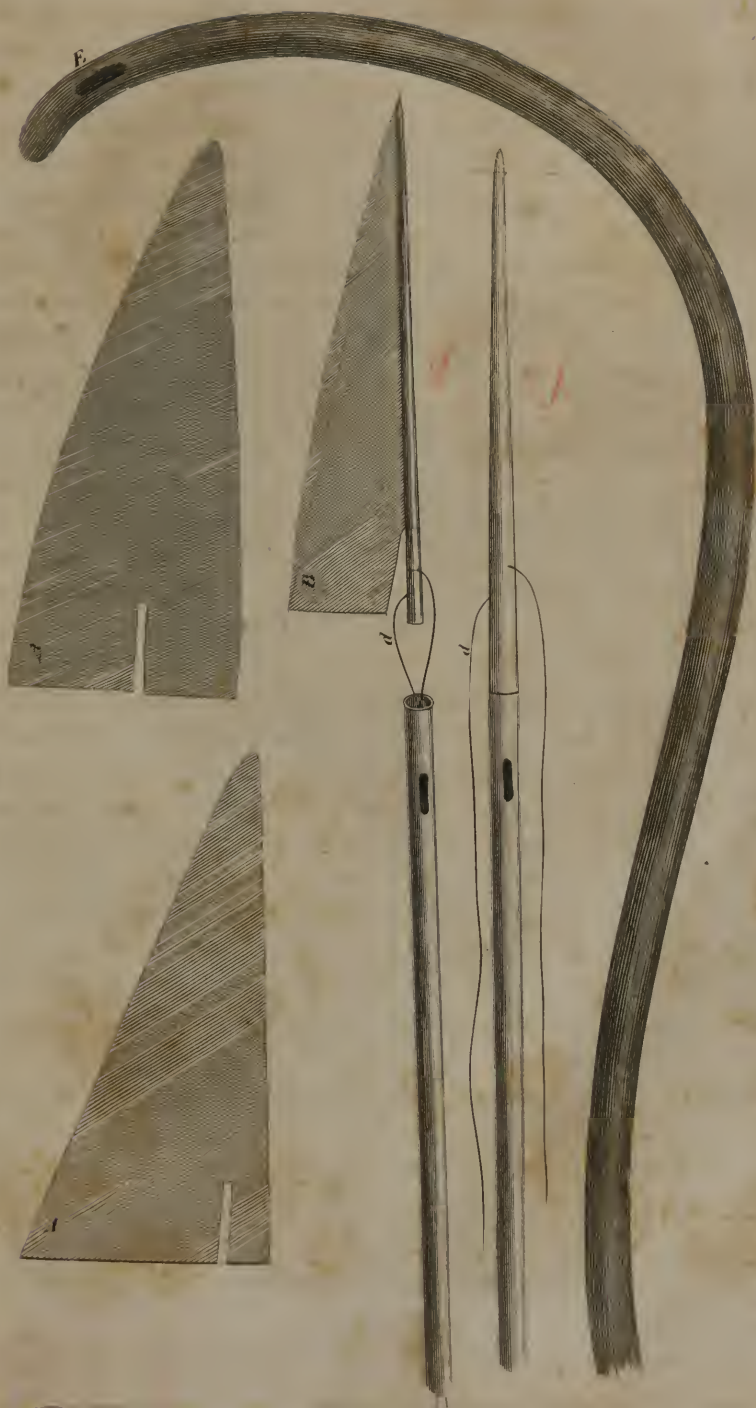
It often happens not only in cases of stricture, but also of enlarged prostate, that a bougie will gain admittance to the bladder when neither a stiff nor a flexible catheter can be introduced. The plasticity of the bougie when formed of pure bees-wax and linen, is much greater than that of the most flexible catheter, and it assumes the form of the part where the obstruction is seated, adapting itself to every curve and contraction in the urethra, in such a manner that in many cases it may be gradually insinuated into the bladder when other instruments cannot be passed.

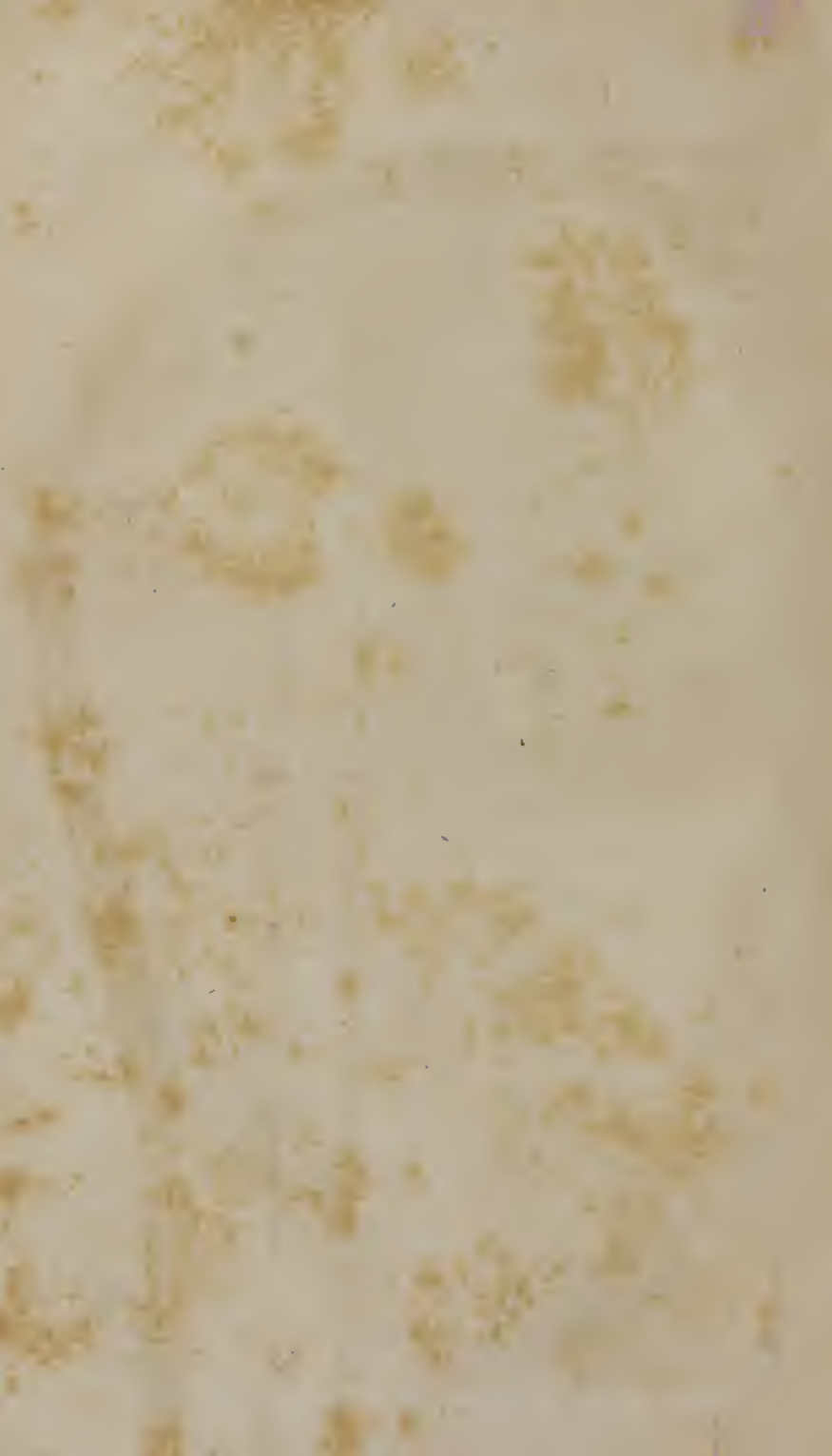
In a case of retention of urine which occurred in the Pennsylvania Hospital in the year 1796, Dr. Physick was able to introduce a bougie, but no urine followed it, and his attempts to pass the catheter were completely abortive; he immediately fastened the point of a bougie upon the extremity of an elastic catheter, and very readily passed the instrument into the bladder and evacuated the urine. In a very great number of instances which have subsequently occurred the same method has proved successful. I consider this one of the greatest improvements which the catheter has ever received and shall briefly describe the mode of attaching a bougie point to a flexible catheter.

A French catheter of the middle size is to be provided, and its point cut off, leaving a continued cylindrical canal through it. A piece of bougie plaster between two and three inches long, is to be cut into a proper shape, for forming a conical point to the instrument. When this plaster is rolled sufficiently to fill the cavity of the bougie, a slit half an inch long is to be made in its lower end, after which the part rolled up, is inserted into the catheter, and the other half is wrapped round its outside and fastened by tying a cambric thread neatly round it. In order to secure still more effectually the bougie point from slipping off, and to extract it, in case this accident should happen, a strong thread is passed through the bougie and fastened to the outer extremity of the catheter.

The opposite plate illustrates the construction of the instrument.

- A. Represents the waxed linen or bougie plaster, cut into the proper form.
- B. Represents the same plaster rolled so as to form a plug to enter the extremity of the catheter.
- C. The bougie point rolled around and attached to the catheter.





The string *d*, is intended to give greater security to the instrument, and in case of a separation of the point from the catheter it would serve for the extraction of the former. Dr. Wistar generally passes the string through the catheter in the manner represented at *e*, which is equally secure and much neater than the other mode.

The bougie pointed catheter succeeds in a variety of cases in which no other instrument can be introduced. In cases of enlarged prostate gland it is particularly successful, and where a considerable portion of the urethra is tortuous from strictures, it can be passed with more ease than any other catheter.

If, however, every attempt to pass a catheter fail, another mode of gaining access to the bladder is occasionally in our power by perforating the stricture in the manner already mentioned.

The instrument for performing this operation is a canula or catheter, curved in such a manner as to pass readily as far as the stricture; in this canula is concealed a lancet capable of being protruded when necessary. The operation is to be performed by introducing the instrument as far as it will go, and then the lancet is to be protruded. In some cases the obstruction is situated beyond the bend of the urethra and in these cases, in order to guard against all danger of wounding any other parts except those intended, the handle of the instrument is to be depressed as low as possible, and when it is pushed onward, it will be found to have divided the stricture and urine will generally escape through the canula. The lancet is immediately to be retracted and the urine evacuated. A catheter must afterwards be introduced and left in the bladder until the new passage heals up. This very important operation which was contrived and has been repeatedly performed by Dr. Physick, has never been followed by any unpleasant consequences, and it has in several cases obviated the necessity of

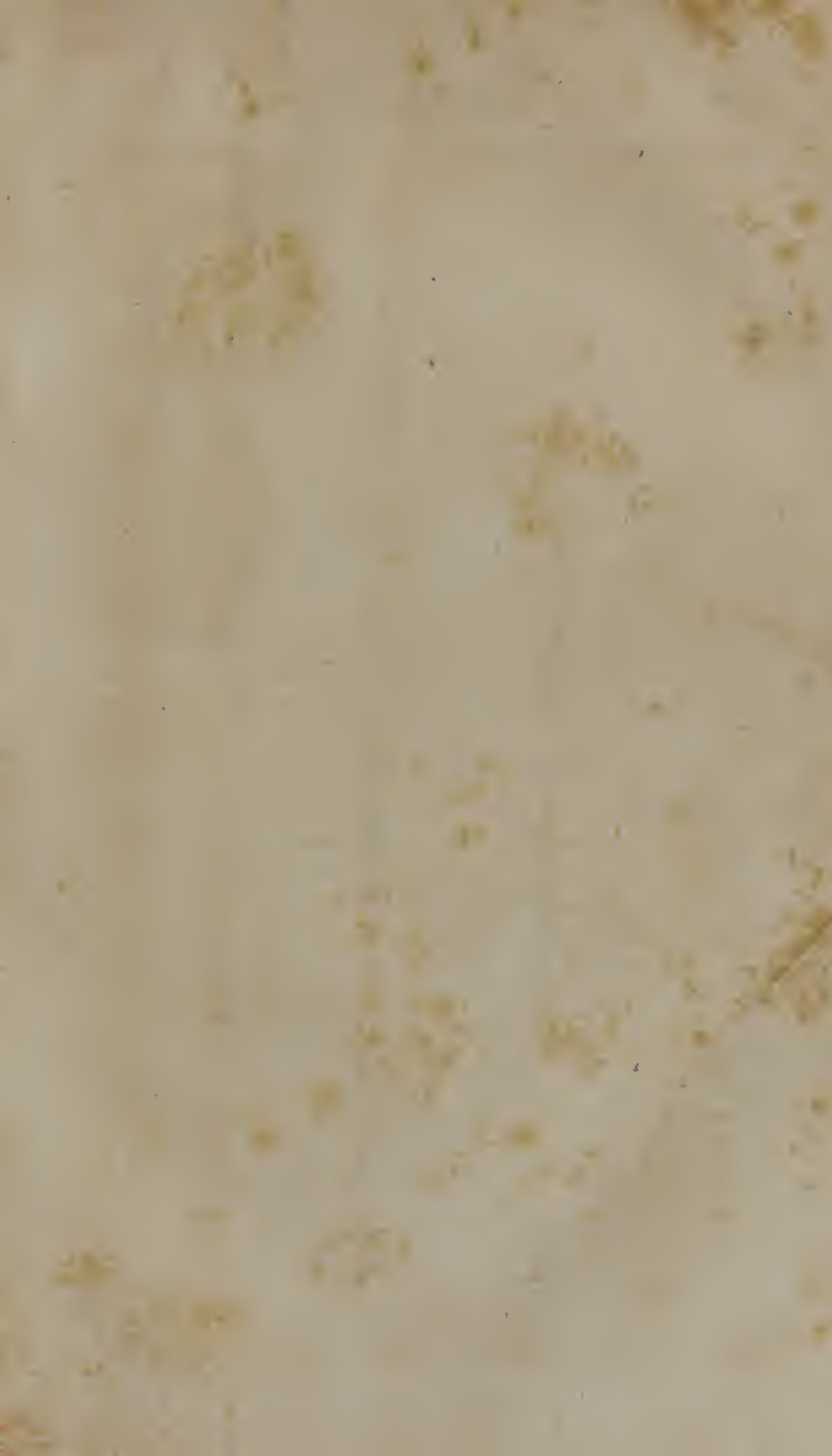
puncturing the bladder, an operation which Dr. Physick has never been obliged to perform, having always succeeded by some of the preceding methods in drawing off the water.

The success of Dr. Physick in this particular, during twenty years of extensive practice is a strong argument in favour of Mr. Abernethy's opinion that the tapping of the bladder is very rarely necessary.

Mr. John Bell in his principles of surgery expresses great indignation against such an operation as I have described. He says "if so rash a thing has been done, I protest against it as a sword put into the hands of a fool; such an instrument (a trochar-pointed catheter) would soon be in the hands of every young man, and would prove, what the crotchet is in midwifery, a merciless resource." If that excellent anatomist had only paused long enough to investigate the probable consequences of the operation, he could have convinced himself that no such terrible effects were to be dreaded, as his imagination, fruitful in the invention of horrors, has anticipated, and I am happy in the opportunity of attesting its perfect safety, at the same time that I would urge extreme caution in performing it. No one should undertake it who is not well acquainted with the anatomy of the parts.

Mr. Bell censures with comparative mildness (if his language can even be construed into censure) a much more dangerous expedient, that of forcing onward the catheter till it reaches the bladder. This operation is surely terrible. In Dr. Hunter's hands it proved fatal, and though Mr. Dease succeeded in some cases by this uncertain mode, it is one which no surgeon at the present day will venture to recommend.

The introduction of the catheter in the female subject is an operation of no difficulty to a person acquainted with the anatomy of the parts. Before the operation the



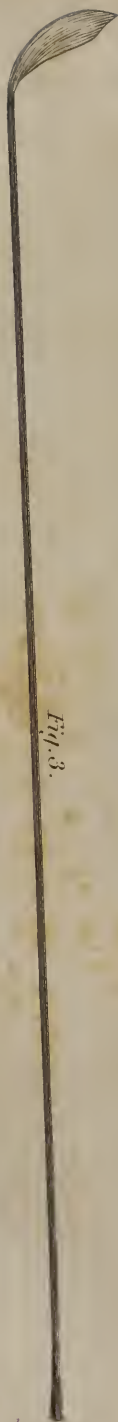


Fig. 3.

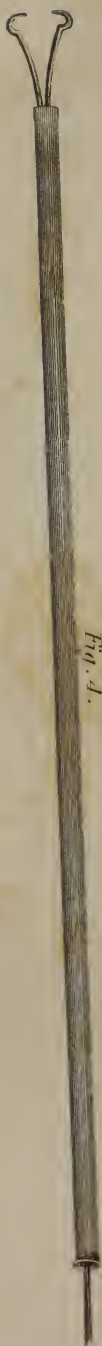


Fig. 4.

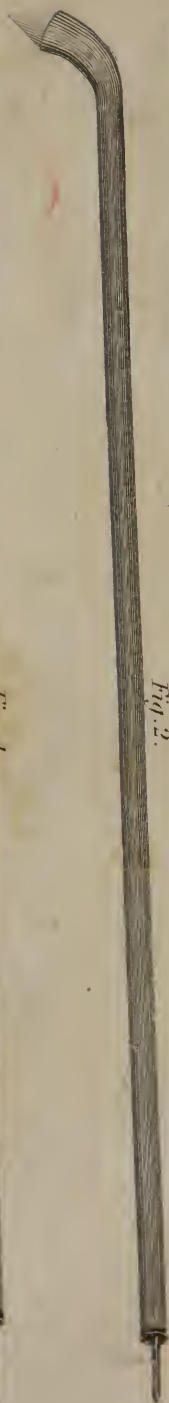


Fig. 2.

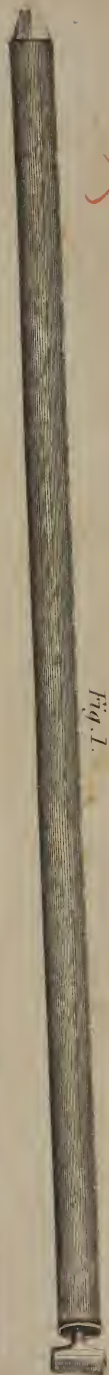


Fig. 1.

room should be darkened, and from motives of delicacy every exposure should be carefully avoided. The catheter is to be held in one hand, and the fore finger of the other is to be placed upon the clitoris, from which a smooth surface extends backwards a small distance and terminates at the orifice of the urethra; the finger passed along this smooth surface soon distinguishes the precise situation of this canal, and the catheter is then to be introduced and passed into the bladder.

In the opposite plate are represented,

- Fig. 1. A straight canula and lancet for dividing the stricture at or anterior to the bend of the urethra.
2. A curved canula and lancet for the purpose of dividing the stricture when beyond the bend.
 3. The lancet separated from the canula. It is best to have it made with a thin wire stem, because it will be found to move more readily in the canula.
 4. Forceps for extracting calculi from the urethra.

CHAPTER XXII.

Of Tapping the Bladder.

THIS operation becomes necessary when all other means of evacuating the urine are found ineffectual.

In itself it is by no means a dangerous operation, but it is very frequently followed by death, in consequence of being performed too late. Mr. John Bell remarks that in this case, as in strangulated hernia and lingering labours, *delay is the greatest danger*, and yet a remark which follows soon after is of equal importance, “the worst signs are no sure proofs of gangrene. In the most hopeless cases let the patient have his chance for life.”

Mr. Charles Bell considers the fourth day after a total obstruction to the urine as the most favourable period for the operation.

The bladder may be tapped from the perineum;—above the pubes—and through the rectum. The difficulty of the first of these operations is considerable, and the extent of incision comparatively great. It has nearly gone into disuse, but I have been informed that it has lately been performed in London; Mr. Astly Cooper plunges a lancet boldly into the bladder from the perineum, an operation formerly performed by Dr. Jones of this city.

OF THE PUNCTURE ABOVE THE PUBES.

In many cases of retention of the urine the bladder may be very distinctly felt rising nearly to the umbilicus. In such cases there is no danger of wounding the peritoneum in puncturing above the pubes.

An incision is to be made with a scalpel about an inch in length, through the skin and fat which cover the lower part of the linea alba; this incision should be made about half an inch above the pubis, and should extend between the pyramidal muscles down to the linea alba. A curved trochar (the curvature of which forms a segment of a circle seven inches in diameter) is now to be pushed into the bladder, the stilet being withdrawn, and at the same time the canula pushed further inward, the urine will flow freely through it. The canula is now to be fastened by tapes to a baudage passed round the body, care being taken to leave the orifice free, and to this should be adapted a plug of cedar, to be removed from time to time. A short catheter bent so as to fit the canula should be passed through it, in order to prevent the edges of the instrument from irritating the inner coat of the bladder.

After a few days the adhesive inflammation will consolidate into a perfect canal the aperture through which the canula has passed, and then the instrument being removed, an elastic catheter of the same diameter may be introduced, and changed once a week, as long as the circumstances of the case may require.

The wound is to be healed whenever the natural passage for the urine is sufficiently pervious.

This operation I once performed in an old gentleman in whom the urethra was completely obliterated, and the surgeons in attendance had no hope from the long duration of his disease and the great extent of the stricture, that he would ever evacuate the urine by the natural passage. He survived the operation several months during which time he was not much incommoded by the new method of making water. A fistulous orifice formed round the canula, and every drop of water was discharged through the instrument, the urethra remaining impervious.

Desault performed the operation frequently with success.

OF PUNCTURING THE BLADDER THROUGH THE RECTUM

The finger passed into the rectum readily comes in contact with the prostate gland, and immediately above this in cases of retention of urine the distended bladder is perceived lying nearly in contact with the rectum, a little cellular substance alone intervening between them ; at this place a curved trochar similar to that used for the operation last described, can be easily introduced, upon the fore finger of the left hand. The posture of the patient when the operation is performed should be the same as in Lithotomy.

This operation is very easy and very safe. The only caution necessary is to avoid the vesiculæ seminales which is done by making the puncture considerably above the prostate gland, and exactly in the middle of the tumour formed by the distended bladder. The canula should be left in the wound until the urine resumes its natural course, although in a case where it was accidentally removed very soon after the operation, no ill consequences followed. As the canula would prove extremely inconvenient when the patient had an evacuation from his bowels, an elastic catheter could no doubt be substituted with advantage.

In cases where the prostate gland is greatly enlarged or where the rectum is diseased, the puncture cannot be readily made through the rectum and that above the pubes is to be preferred. The puncture through the rectum ought only to be performed where it is fairly presumed that the natural passage will ere long become pervious. An interesting case of the operation is related by Dr. Hamilton in the Philosophical Transactions, which proves its safety. Dr. Hamilton's patient speedily acquired the

power of discharging or retaining his urine at pleasure—a circumstance ascribed by Mr. John Bell and probably correctly, to the action of the levator ani muscle. The testimony of Mr. Home is favourable to this operation. He performed it in four cases. Mr. Charles Bell also recommends it.

It is seldom necessary to puncture the bladder in females. When, however, the operation is required, it can be very readily performed by passing a trochar through the vagina into the bladder, where it may be felt forming a large tumour. In case the obstruction in the urethra is permanent, the canula must be left in the bladder, and in that case it should be sufficiently long to project on the outside of the labia, where it is to be secured by means of a T bandage.

In all cases in which it becomes necessary to leave a canula in the bladder it should be changed at least once in ten days, in order to remove the calculous matter with which its extremity becomes encrusted.

CHAPTER XXIII.

Of Stone in the Bladder.

THE urine in a healthy state contains the matter which when concremented forms a calculus, and all that seems necessary for the formation of a stone in the bladder or kidney is the presence of a clot of blood, or some solid matter upon which this calculus may crystallize or consolidate—whether a nucleus of this kind is always necessary it is not easy nor important to ascertain.

A stone in the bladder is perhaps as painful as any other disease to which the human body is liable, and it is sufficiently common to demand great attention from the student of surgery.

Calculus generally forms in the kidney, and the symptoms of stone commence with a pain in the loins, which becomes very acute upon motion, and is often followed by bloody urine, or urine resembling strong coffee in colour. The quantity is small and is sometimes totally suppressed. Efforts to vomit take place and the stone is commonly forced into the ureter, temporary relief is experienced, but the symptoms soon return and continue until by degrees the ureter becomes dilated and affords a passage for the stone into the bladder. The warm bath, anodyne glysters, and the copious use of diluent drinks greatly facilitate the descent of the stone, and afford much relief to the patient.

When complete relief for a time is experienced after the preceding symptoms, there is great reason to believe that a calculus has been formed in the kidneys, and has

descended into the bladder. It is of course small, and at this time the patient should be directed to drink freely of barley water, and when the bladder is distended with urine, to void it forcibly in a full stream, bending the body forward so as to render the neck of the bladder its most depending part. In this manner small calculi are sometimes discharged from the bladder, and much future suffering of the patient prevented; but this termination, in the male subject, is not very frequent, and more commonly the size of the stone gradually augments, and the symptoms of stone in the bladder are experienced.

One of the most usual symptoms which attends throughout the whole course of the complaint, is an itching of the perineum and glans penis. In order to relieve this the patient pulls the prepuce, and this becomes, especially in children, greatly elongated. Great difficulty is experienced in making water; the urine flowing in a full stream is suddenly interrupted by the stone falling over the neck of the bladder; and when the bladder is nearly emptied, violent pain is felt. The bladder is incapable also of containing as much urine as in health, and desires to empty it are very frequent. Tenesmus frequently attends; pain is felt in voiding the stools, and a discharge of semen occasionally takes place when the bowels are evacuated. The mucus of the bladder is discharged with the urine in considerable quantity, and very frequently a sandy matter is mixed with it, the smell being extremely fetid. A prolapsus ani occasionally takes place. Violent spasm of the bladder—dyspepsia—loss of appetite—diarrhæa, together with pain in various parts of the abdomen, often attend. The patient experiences an aggravation of these symptoms after exercise, or any irritating cause. A violent jolt is generally followed by bloody urine. Sometimes without any assignable reason a very severe exacerbation of pain, and all the other symptoms come on, this is called a fit

of the stone and perhaps no sufferings transcend those experienced by a patient under such circumstances.

The preceding symptoms seldom exist except the patient have actually a stone in the bladder, and yet as Bromfield remarks, "all together in the same subject they are not sufficient authority to perform the operation, unless the stone be first felt by the staff." Sir James Earle considers the least fallible sign to be the discharge of urine without pain, and violent pain after the bladder is emptied, arising from the contraction of the bladder upon the stone.

The introduction of the sound however is never to be neglected when there is reason to suspect a stone in the bladder. The sound is a polished steel instrument, resembling a catheter in shape, but not like a catheter hollowed; its point is also lower and straighter that it may touch every part of the bladder. The method of introducing it differs in nothing from the introduction of a catheter; but in searching for a stone, the posture of a patient and the shape of the sound may be varied greatly: if the stone be not found in one posture, another, and another must be tried. I have seen Dr. Physick in two cases succeed in detecting a stone with the sound, by placing his patient nearly on his head, so that the fundus of the bladder became the most depending part.

When a difficulty of finding the stone exists, the bladder should be examined in different states of fulness, and sometimes a silver catheter introduced has discovered a stone when it could not be felt with a sound, the urine in such cases flows through the catheter, the bladder contracts and forces the stone and the instrument in contact: the introduction of the finger into the anus often assists in finding the stone, and enables us to ascertain in some measure its size and form. When they come together the sensation is not to be mistaken for any other, it may be distinctly felt and heard.

A stone once found, it will be useless to consume time in endeavours to dissolve it. The use of lithontriptic, or as they are now more properly denominated, antilithic medicines are very serviceable in alleviating the symptoms of stone, and in case of a severe paroxysm, opium, the warm bath, and blood letting, are useful. We are acquainted with a variety of medicines capable of dissolving stone, when out of the body, but most of them are too irritating to be injected into the bladder. The gastric liquor of many animals possesses solvent powers in a very great degree, and dissolves among other articles, the urinary calculus. In my inaugural thesis published in 1802, are detailed some experiments which prove that this fluid may safely be injected into the bladder of a patient with stone, and that portions of calculus are evacuated after such operations. It is to be feared, however, that the accretion progresses almost as fast as the solution, and therefore unless some more powerful solvent can be injected, the operation is the only resource.

The most useful of the antilithic medicines, are, the various combinations of carbonic acid;—the different alkaline medicines;—magnesia;—and uva ursi. The mode of exhibiting these articles, may be found in the different dispensatories. That stones of considerable size have been dissolved occasionally by the use of these articles, I have no doubt, but that such an event is extremely rare is most certain. I once dissected a gentleman of this city who had been sounded some years before he died, and a stone was evidently perceived, the sound of the staff striking on the stone was audibly distinct. This gentleman's bladder contained no stone at the time of his decease.

Without entering into a history of the operation of lithotomy which would occupy a volume, I shall pro-

ceed to describe the manner of performing the operation which I consider most advantageous.*

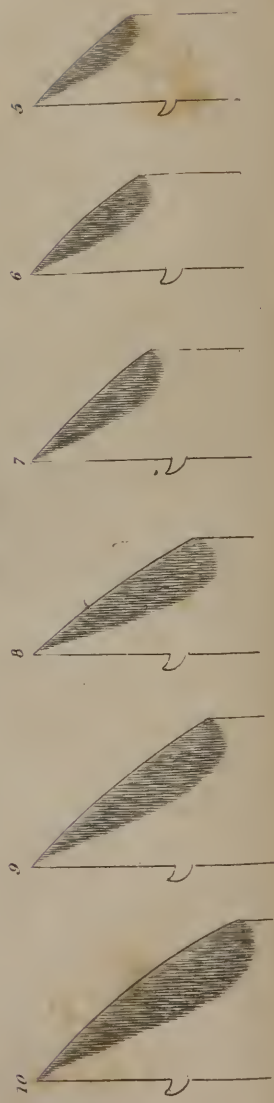
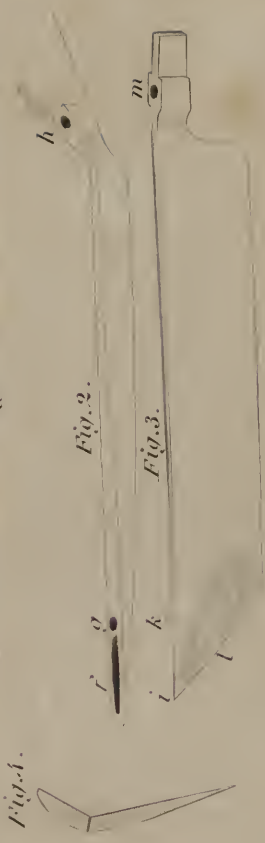
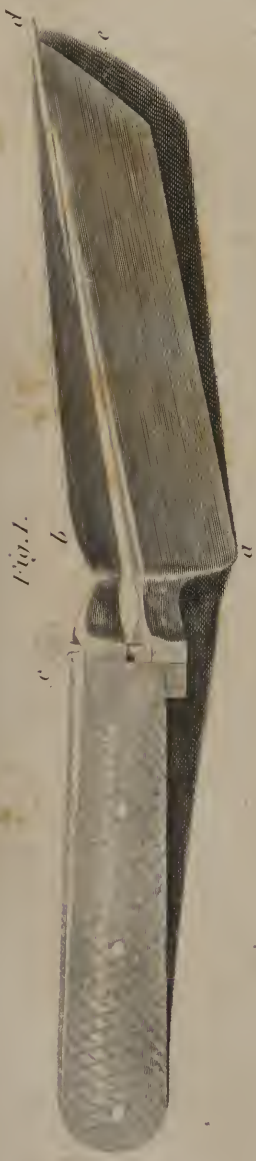
The instruments necessary for performing the operation, are, strong garters or bands for securing the patients hands and feet,—a grooved staff or director, adapted to the urethra,—a scalpel,—a sharp pointed straight bistoury,—a gorget or knife for dividing the neck of the bladder,—forceps of various sizes for seizing and extracting the stone,—scoops or levers of different degrees of curvature,—a sharp-pointed curved bistoury, for enlarging the wound in the bladder, if necessary,—strong forceps with a screw in the handle to break the stone if it be too large for extraction,—a glystering syringe and pipe, together with warm barley water, to wash out any fragments of stone,—sponges, warm water, needles, ligatures, tenaculum,—a needle and curved forceps, for tying the pudic artery if it be cut, and warm olive oil for the purpose of lubricating the instruments.†

All the instruments which the surgeon can possibly need should be at hand, and carefully put in order before the operation. The beak of the gorget should be adapted to the groove of the staff, and should move readily in it. The gorget should have a perfectly keen edge, especially at that part which commences the incision, which is the part immediately connected with the beak of the instrument. There is no method of having this part of the gorget perfectly keen, but by having the beak and blade separable, and Dr. Physick has accordingly for many years had his gorgets constructed in this manner.

* A very excellent account of the various methods of extracting stones from the bladder, and a very good history of the improvements which have been successively made in lithotomy may be found in the principles of surgery by John Bell, 2 vol.

† I have not thought it necessary to represent in engraving, all these instruments as the most of them are familiar to every student of surgery. There are some however which it will be proper to delineate because they are not in general use.





As I consider this an object of primary importance to the success of the operation, I shall describe the gorget of Dr. Physick which is represented in the adjoining plate.*

Fig. 1. Gives a perspective view of the gorget; the blade a little open to shew in what manner it is connected to the stem and secured by the screw.

- a.* The blade.
- b.* The stem.
- c.* The screw.
- d.* The beak.
- e.* The cutting edge.

Fig. 2. The stem of the instrument comprehending the shaft, and beak.

- f.* A groove gradually deepening to admit the point of the blade fig. 3.
- g.* A perforation in the direction of, and to admit, the peg *k*, as a further security, and to prevent injuries to the point of the blade by the upper part of the groove *b*.

h. The opening in the handle, admitting the blade.

Fig. 3. A back view of the blade as relieved from the stem.

- i.* The point.
- k.* The peg.
- l.* The cutting edge, the curved line shewing the manner of grinding it away to form the edge.
- m.* The female screw.

Fig. 4. A section of the gorget of a proper size, describing the angle formed by uniting the blade and stem.

Figs. 5, 6, 7, 8, 9, 10, represent six blades, of various sizes, adapted to one common beak, whereby the surgeon is furnished with a gorget proper for patients of

* This instrument is extremely well made by Mr. Bishop, from Savigny's manufactory, London, who published a description of it in Coxe's *Medical Museum*, in 1804.

every age, and at an expense not exceeding one fourth the price of a set of common gorgets.

The size and angle of the blade and haft of the instrument should be similar to those of the common gorget. The length from the beak to the angle four and a half inches; the handle four inches long. The drawing represents the instrument on a smaller scale. The width of the cutting edges in figures 5, 6, 7, 8, 9, 10, are accurately copied from Dr. Physick's instruments.

Dr. Physick has had a similar gorget constructed with a double blade, but there are very few occasions where the stone is so large as to require its use.

The patient about to submit to lithotomy should if practicable choose the spring or autumn in preference to the cold or hot months. The operation should never be performed during a paroxysm of stone. A temperate diet should be directed for some time previously, and if plethoric the patient should be bled. It is well to administer, on the day preceding the operation, a dose of castor oil, and to empty the rectum two hours before the appointed time by an injection. The perineum should be shaved, after which an œnema of laudanum and water may be administered, an hour or more before the operation, or what is equivalent a few grains of solid opium may be introduced into the rectum, and the patient should void no urine for several hours before the time affixed for operating.

OPERATION.

The patient is to be placed on the end of a common dining table, with the leaves down, covered with blankets. The staff is to be well oiled and introduced; the different surgeons present take hold of it and satisfy themselves that they feel the stone. A strong fillet or garter is fastened by means of a noose, round each wrist,

the patient is directed to grasp his feet with his hands, and by means of the fillets they are securely bound together.

The patient is now placed close upon the edge of the table, his head and back being supported by pillows in such a manner as to present the perineum in a convenient manner to the operator. In this posture he is to be held by two assistants who stand along side of the table (which of course should be narrow) and place the knees of the patient in their armpits, separating his limbs and firmly holding his feet.

Another assistant takes hold of the staff with one hand and with the other raises the scrotum so as to expose the perineum. He is to hold the staff in such a manner that it may project a little towards the left side of the perineum. The usual attempts to make its convexity very prominent, are however, attended with risk of forcing the staff out of the bladder, and there is no advantage in it, because the first incision should be made without any reference to the staff.

The surgeon being seated conveniently, commences the first incision with a scalpel, the point of which he inserts through the skin, at that part of the perineum which is immediately opposite the lower end of the arch of the pubis, of course the incision begins at the raphe of the perineum just behind the scrotum; the knife is to be carried steadily in a right line terminating midway between the lower margin of the anus and the tuberosity of the ischium of the left side. The first incision should be deeper than it is commonly made, as there is no danger to be dreaded at this stage of the operation, except a wound of the rectum which is easily avoided. This incision in an adult should be between three and four inches in length. By two or three successive strokes of the knife the incision is to be deepened, and the transversales perinei muscles completely divided—when this

is done the groove of the staff is very readily felt, and the prostate gland at the bottom of the wound. The surgeon now exchanges his scalpel for a sharp straight bistoury the point of which he inserts with the back towards the rectum into the membranous part of the urethra; with this instrument he slits up the membranous part of the urethra by cutting in the groove of the staff from the prostate gland to the bulb and effects in this manner by one stroke of the knife what I have known surgeons half an hour in accomplishing by repeated attempts to dissect down to the staff with a scalpel.* It is of no consequence whether the bulb be cut or not by this incision, it is unnecessary to do it, unless the surgeon should have difficulty in seeing or feeling the groove of the staff, and in that case, no danger attends his slitting the urethra freely forwards, always, however, cutting from the staff, the point of the bistoury being in its groove. The division of the urethra is greatly facilitated by the use of the bistoury, and one simple incision is made instead of twenty. The staff is now laid bare to a considerable extent, and is generally visible, but is always readily felt by the surgeon's finger; it only remains now to divide the prostate gland and neck of the bladder, which may be readily effected by a bistoury, scalpel, or gorget, but far most conveniently by the last named instrument. The surgeon therefore after laying bare the staff places the nail of the left index finger in the groove of the staff and introduces the beak of his gorget previously dipped in warm oil, into the situation where his nail had been, and now rising from his chair he takes the handle of the staff in his left hand and moves the beak in its groove, ascertaining that no membrane or other substance intervenes between the staff and beak of the gorget. He should be certain also

* This direction is not always necessary to be observed, as the staff is often exposed very readily by means of the scalpel.

at this moment that the staff has not slipped out of the bladder. With a gentle steady motion he passes the gorget along the groove of the staff into the bladder, depressing the handle of the gorget in such a manner that the beak may move along the convex part of the staff nearly at a right angle, and the beak of the gorget will consequently take a direction nearly in a line from the anus to the umbilicus. In introducing the gorget Dr. Physick recommends to push the staff and gorget as far towards the right side of the perineum as possible, in order to avoid wounding the pudic artery. The urine gushing from the bladder and flowing along the gorget announces the division of the neck of the bladder. The gorget is instantly removed (and there is no risk of making a wound in withdrawing it unless by great carelessness) and the fore finger of the left hand introduced and brought in contact with the stone. The staff may now be taken out, and the forceps introduced, or if the surgeon have any fears from the smallness of his opening into the bladder, that he will not readily find the passage, he may leave the staff in as a guide for the forceps, but this *ought never to be necessary*. When the forceps dipped in warm oil are introduced, the surgeon should touch the stone before he opens them, and then with one handle in each hand he separates the blades and grasps the stone. It is best to use small forceps at first as they enter more easily, and in general, answer as well as the large ones.

This part of the operation is sometimes very embarrassing. Surgeons have been baffled in their attempts to find a stone with the forceps which with the staff they could readily touch, and sometimes an hour has been consumed in fruitless searches for the calculus. In general the most depending part of the bladder contains the stone, and this is commonly immediately on the rectum, or a little to one or the other side of it, the elevation

of the handles of the forceps, therefore commonly brings them in contact with the stone. The introduction of a finger into the rectum frequently facilitates very much this part of the operation. In some cases the stone is situated near the fundus of the bladder; in these cases a scoop may be used to draw it towards the wound in the bladder. In all cases of difficulty in finding the stone, it is better to search with a finger or a female catheter, than with the forceps. The bladder is often filled with clotted blood, this should be rinsed out with warm barley water if it prevent the extraction of the stone.

The surgeon having grasped the stone with his forceps, should be careful that he has taken hold of it in the shortest diameter so that it may occasion as little laceration as possible whilst it is extracted. The use of a simple lever which is contained in all lithotomy cases, assists greatly in placing the stone in a position convenient for extraction. When this is done a regular but forcible effort is to be made and the stone extracted. The extraction may often be facilitated greatly by moving the forceps from side to side, using in this manner each blade as a lever. It sometimes breaks in the grasp of the forceps, and then the larger fragments are to be successively taken out by the forceps, the smaller ones by means of a scoop, and the detached sandy matter is to be washed out by injecting forcibly a stream of warm barley water into the bladder, which will be evacuated through the wound, *pleno rivo*, and with it all the smaller particles of calculus.

Sometimes the stone is too large to be extracted, and then it is to be broken, by means of a strong pair of forceps with a screw in the handles, and the pieces extracted as we have just directed, but if a small enlargement of the wound in the neck of the bladder will enable the surgeon to effect the extraction without recourse to this

expedient, it will be better to introduce the index finger of the left hand into the bladder, and then a curved bistoury with a sharp point may be used in such a manner as to enlarge the wound, the surgeon cutting down upon his finger, runs no risk of wounding any important part, the prostate gland may be thus divided with great facility to any necessary extent, and the extraction of a very large stone may in this manner, in general, be conveniently effected. The surgeon should always remember, that it is better to *cut* than to *tear*, and the maxim of Celsus should never be forgotten “*plaga, paulo major quam calculus sit.*”

The surgeon should next examine if any other stone remains. If the stone have a rough surface it is generally considered a proof that no other remains, the finger however or a female catheter should be introduced for the purpose of ascertaining this fact.

One of the chief subjects now demanding attention is the hemorrhage. It always happens that some considerable blood vessels are divided and bleed freely in this operation. The arteria transversalis perinei is always cut, as it runs directly across the perineum in the course of the incision. This artery is easily secured with a ligature if it bleed freely, but commonly it stops after the operation is completed.

The artery of the bulb of the urethra is occasionally divided, and sometimes it is necessary to tie it up, but the chief danger arises from the pudica interna, a very large artery running along the ramus of the ischium which is sometimes wounded by the edge of the gorget. When this happens the hemorrhage is profuse, and in many cases has proved fatal. I am happy in being able to describe a method of securing this vessel which obviates in great measure this danger from lithotomy.

In the year 1794, although a boy, I had the honour of assisting Dr. Physick in his first operation for stone.

and it happened that in passing the gorget he divided the pudic artery. He immediately placed a finger upon the spot, the bleeding ceased, and he felt distinctly the trunk of the vessel pulsating between his finger and the ramus of the ischium. It was evident that if the flesh between his finger and the bone could be compressed, the hemorrhage would be commanded. He accordingly passed a tenaculum under the trunk of the artery, the point of which came out near the bottom of the wound. A strong ligature was then passed under the projecting point and handle of the tenaculum, and was firmly tied, it included consequently a portion of flesh, in which the wounded artery was contained, and effectually stopped the bleeding. This measure, which was contrived and executed in as short a time as I have consumed in describing it, can no doubt be applied in similar cases with equal advantage: the opposite plate Fig. 1, conveys an idea of the manner in which this was effected. Another mode however which promises to be more easily executed, consists in passing an armed needle contained in a curved forceps (Fig. 2) under the artery, bringing it out near the bottom of the wound and then tying the ligature. This operation I have never seen performed, but have no doubt that it could easily be done.

After the operation is completed, the patient is to be placed on his side, on a mattress, without any dressing to the wound, a folded sheet being laid under him in such a manner, that as fast as it becomes wet by the urine, a dry part may be substituted, and to prepare the mattress, a piece of waxed linen may be placed under the sheet. A low diet and rest are the only remedies necessary.

In some cases the patient has no unpleasant symptom in consequence of the operation, and in other instances death results without any evident cause. Mr. Charles



Bell says he has known "the violence of the operation, without hemorrhagy or inflammation, to kill the patient in about ten hours." I have seen patients die in three or four days without inflammation. Sometimes gangrene results from the escape of urine into the surrounding cellular texture, and sometimes the bladder inflames violently and death results from this cause. Peritoneal inflammation in some instances comes on, terminating very speedily in death. In cases where inflammation runs high, bleeding, and evacuating remedies are to be used and large blisters are to be applied over the abdomen.

In general the urine flows for the first few days after the operation through the wound, but in two instances in which I performed lithotomy it was my good fortune to witness the healing of the neck of the bladder by the first intention. In the first case (which occurred in private practice) not one drop of urine ever flowed through the wound after the operation was completed, a circumstance which I ascribed to the smallness of the stone, and the consequent absence of contusion. This patient walked about in two weeks, and his wound was healed before three weeks had elapsed. The other case occurred in the Pennsylvania hospital, the stone was much larger, and it required great force to extract it. The urine in this patient flowed during the afternoon and evening of the day on which I operated, through the wound, but never again, and the wound healed as if in one of the limbs.* I have no hesitation in ascribing the successful termination of these cases to the use of a gorget which is so perfectly keen, as to pass without any resistance through the prostate gland and neck of the bladder.

I have purposely avoided noticing the various modes

* Copeland in a note contained in his work on the rectum, mentions a case where the wound made in lithotomy healed by the first intention. Dr. Physick once met with similar success

of operating, now in use in Europe. The knife has many advocates, and the lithotome cache some. I have seen a very celebrated surgeon in Paris, cut off an arm; cut out an eye, and perform lithotomy with the same bistourie, but I confess this simplification of apparatus is carried farther than I approve, and since I am persuaded that most of the objections to the gorget have originated from the use of bad gorgets, I have no hesitation in recommending a sharp gorget as the most convenient knife with which the bladder can be opened in lithotomy.

An operation called NEPHROTOMY has been proposed for the extraction of stones from the kidney. It consists in making an incision through the integuments and muscles immediately over that gland, and afterwards exposing and opening the pelvis of the kidney, sufficiently to allow the extraction of the stone.

This operation has never I believe been performed, and probably never ought to be. It is in almost every instance doubtful, whether there exists a stone in the kidney, because every symptom resulting from such a cause occasionally occurs, when there is no reason to believe the existence of a calculus, and on the other hand where these symptoms have been ascribed with great probability to that cause, a speedy and permanent relief has been obtained without recourse to an operation;—circumstances which render the performance of so dangerous an operation highly unwarrantable.

There is however one case in which it would be proper to make an incision in the vicinity of the kidney for the extraction of a stone, and that is when suppuration has taken place, and an abscess has formed; as soon as the tumour becomes prominent it would be practicable and safe to make an incision into it, and extract the stone. The great blood-vessels being in this case anterior to the abscess would not be endangered.

The operation of lithotomy in the female, consists in simply enlarging the urethra, laterally by means of a scalpel or gorget, and a short straight director or staff. It may also be done by cutting through the vagina upon the staff, but incontinence of urine is apt to follow ; as it does indeed in some cases after the former operation. Lithotomy in the female, is an operation of no more difficulty, than the dilating of a sinus with a scalpel and director. Indeed it may often be done with sponge tent, and many cases of success by this plan are recorded.

CHAPTER XXIV.

Of Fistula in Ano.

WHEN abscesses form in the vicinity of the anus, they are generally very difficult to be healed, and become fistulous.

The complaint generally commences with a phlegmonous tumour near the anus, attended with considerable pain and hardness. In this stage it is often mistaken for a hemorrhoidal affection, and this mistake prevents the application of the necessary remedies. The tumour advances gradually to suppuration, and matter is formed. In some cases the disease proceeds thus far with but little pain, and I have known a patient with fistula, utterly ignorant of the time when the disease formed. In other instances it is attended with extreme pain; with great swelling, and with extensive suppuration, with disury and even suppression of urine from the pressure of the tumour upon the neck of the bladder or the urethra.

Fistula in ano sometimes results from an erysipelatous affection of the nates, and in these cases the disease is generally extensive, in consequence of the mortification which takes place in the surrounding cellular texture. I have also known a psoas abscess to point near the buttock, and when opened more than a gallon of pus was evacuated. The patient recovered and the upper part of the abscess healed, but a fistula formed which required a surgical operation. I have witnessed so many cases of fistula, in patients affected with pulmonary consumption, that I am disposed to consider it, frequently symptomatic of that disease. In all the instances I have

met with, the patient has died soon after the healing of the fistula.

TREATMENT.

The treatment of the disease depends upon the stage at which the surgeon is called. Should he be sent for before suppuration has taken place, the usual remedies for inflammation are to be prescribed, with a view of preventing it. I shall not detail them, but simply remark that leeches in addition to the other evacuations are of great use in the present case, fifty or sixty may safely be applied to an adult, with an inflammatory tumour near the anus. Nothing is more ridiculous than the manner in which leeching is directed by the British surgeons; they speak of a leech, or two, as beneficial. To obtain advantage from leeches, in cases like the present, from eight to sixteen ounces of blood should be drawn by them, and this quantity can only be evacuated from an inflamed part by applying from twenty to sixty leeches.

If the surgeon be called after suppuration has taken place, or if notwithstanding his exertions the abscess point externally, it should be opened early with a lancet in order to prevent an extension of the disease by ulceration. When this is done, a poultice is to be applied, and a free discharge of matter takes place, after which the abscess sometimes (though rarely) heals, as in any other place. More commonly the sore remains open, discharging matter by an aperture near the anus, and a fistulous sinus forms. The disease in this state has no communication with the rectum, and is called an INCOMPLETE FISTULA. In some cases beside the external opening, another is formed into the rectum, and a probe passed by the external aperture comes in contact with a finger in the rectum, this constitutes a COMPLETE FISTULA, from which flatus and fæces mixed with pus are often

discharged. An OCCULT FISTULA is that in which the abscess opens into the rectum, but not externally; an event which sometimes happens.

The treatment of all these cases consists in laying open the fistulous ulcer in such a manner that the rectum and the fistula may form one cavity, with a free external aperture. The mode of performing the operation is to place the patient bending over a table, the nates being separated by an assistant. The depth and course of the sinus being previously ascertained by careful examination with a probe, the surgeon passes the index finger of his left hand, well oiled, into the rectum, and a narrow curved bistoury down to the very extremity of the sinus. If the fistula be complete, his bistoury and finger will come in contact, and they are to be drawn out together in such a manner as to divide the rectum from one end of the fistulous ulcer to the other. If the fistula be incomplete, a hole must be made through the rectum, by means of the bistoury, and the operation finished in the same manner. In the former case a blunt pointed or probe-pointed bistoury answers best; in the latter it is necessary to have the point of the instrument sharp, to puncture the rectum. Dr. Physick has constructed a bistoury, which combines, to a certain extent, the advantages of the blunt and sharp pointed bistouries, and possesses some advantages over both. The annexed plate represents this instrument.

Fig. 1. The instrument in the handle half open.

Fig. 2. The silver guard. *a. a.* a small button on each side of the guard to relieve it from the blade.

b. A notch or slit in the guard which slides upon the screw *c*, to secure it upon the blade.

Fig. 3 and 4. The extremities of the blade and of the guard to shew the manner of their connexion.

When the instrument is furnished with the guard it resembles a probe, and may be passed down to the bot-

Guarded Bistoury





tom of the sinus, and by pressing forward slightly the guard it is detached, and the naked blade remains very nearly in the same spot where the probe had been. The guard defends the sinus from all the irritation which results from the sharp edge of the common bistoury. This instrument combines all the advantages of the probe pointed and sharp pointed bistouries except one, which is that the sharpness of the point when the guard is detached, is apt to prick the surgeon's finger in the rectum, an inconvenience which it possesses in common with the sharp pointed bistoury, and which can only be obviated by defending the end of the finger. This may be done with a piece of thin lead, or a common thimble secured by a string fastened to the wrist. I have often used the instrument, however, and have preferred the trifling puncture to the trouble and inconvenience of the thimble. The bistoury is extremely convenient for opening other sinuses, for dividing the prepuce in cases of phymosis, and for many similar surgical purposes. A variety of guarded bistouries have been contrived. I think this the simplest and best.

After the operation, a dossil of lint should be introduced between the edges of the wound from one end of the incision to the other, in order to prevent the reunion of the cut surfaces. After the first dressings come away either with a stool, or by suppuration, light dressings of lint are to be applied.

When several sinuses exist they are to be treated in the same manner, and laid open into the rectum.

In cases of occult fistula the surgeon can commonly perceive a tumour formed by the collection of pus, or fæces in the sinus, and this he opens externally with a lancet, after which the treatment is similar to that of a complete fistula. But I have seen a kind of occult fistula, formed just within the verge of the anus, and seated under the skin at this place, which discharges pus and oc-

casions much irritation ; in this case the sinus is to be sought by means of a bent probe, and the whole sac is to be removed with scissors. I have seen several cases of this disease, and all have been cured in this manner.

There are some cases of fistula in which the sinus extends beyond the reach of the finger, and other cases in which arteries of considerable size are situated in such a manner as to be wounded by the common operation. In such cases it has been the practice of Desault, in which he has been followed by other surgeons, to pass a leaden wire through the fistula and out at the anus. This wire is to be twisted from time to time in such a manner as to compress the part of the rectum usually divided by the bistoury, so as to occasion ulceration and an absorption of the part. In this way the sinus gradually heals above the leaden wire, and by the time the parts are ulcerated through, the cure is nearly completed. When the fistula is complete, a perforation must be made through the rectum by means of a stilet adapted to the canal, which is to be received upon a piece of wood introduced into the anus, after which the wire passed through is to be drawn down by forceps ; for a more particular account of this mode of treatment I refer to Desault's posthumous works published by Bichat.

It often accelerates the cure to commence it by Desault's plan, and after the wire has acted long enough to bring the sinus down within the reach of the bistoury, to divide it with this instrument.

CHAPTER XXV.

Of Hemorrhoids.

A varicose or preternaturally distended state of the veins in the vicinity of the anus constitutes the disease called Piles or Hemorrhoids. In some chronic cases the tumour appears to consist of a solid fleshy mass without any enlarged blood-vessels. A patient afflicted with this disease is subject to copious discharges of blood from a rupture of the veins whilst evacuating his bowels, and fatal hemorrhage has occasionally resulted. The founder of the Arian heresy, and the philosopher Copernicus, are celebrated characters said to have perished in this manner. The inconveniences attending the complaint are often extremely great and a variety of dyspeptic symptoms are occasioned. Extreme pain is experienced in going to stool, followed by violent tenesmus, by profuse bleedings, and by a prolapsus ani, or descent of a large mass of hemorrhoidal tumours, which sometimes remain obstinately enlarged and irreducible.

The tumours are generally internal and are covered by the lining membrane of the rectum, but sometimes external tumours exist formed of the common integuments.

The disease is peculiarly frequent in sedentary men, whose digestion is impaired, and it also occurs in others of costive or irregular habits of body. Pregnancy, enlarged abdominal viscera, and other circumstances which interrupt the circulation of blood through the bowels are frequent causes of hemorrhoids.

At times the symptoms are mild, and at other periods they are greatly aggravated. An attack of piles is generally treated by bleeding, laxative medicines, leeches, and cold and astringent applications to the part; when the tumour remains externally, and is constricted by the sphincter ani, leeches and cold applications are extremely useful, and a variety of astringent lotions and ointments have been contrived for the purpose of affording relief. Those which I prefer, are the common ointment prepared by mixing very finely powdered galls with hog's lard, and another ointment formed of white lead mixed into a paste with laudanum, and then incorporated with simple cerate. The ingredients of this ointment, though they by no means form a neat chemical compound, can yet be sufficiently well combined for use, and they form a very comforting application to the part.

A radical cure, however, should always be attempted by extirpating the hemorrhoidal tumours, either with a ligature or knife. Mr. Abernethy has of late highly commended the latter, as an operation equally safe and much less painful than the former, but the accidents which have resulted from wounds of the hemorrhoidal veins induce me to prefer very decidedly the ligature. It is unquestionably painful, but is safe and certain. The operation consists in affixing a strong ligature upon the protruded tumour, whilst the patient strains as if at stool in order to propel them as much as possible. A particular description of such an operation is unnecessary. The only cautions I would urge, are to tie only one tumour at a time, and to tie it so firmly as to intercept completely all circulation, so that the part may mortify and drop off. A low diet should be observed, and if great pain result from the operation opium should be administered. The best local application is a cold poultice supported by a T bandage. When the tumour falls off a second can be tied, and all may be thus removed

in succession. Where the base of the tumour is too large to admit the application of a ligature, a needle armed with a double ligature must be passed through its base, and one string tied round each half of the tumour.

Mr. Ware thinks it unnecessary in general to remove all the hemorrhoidal tumours, he believes the pain to proceed chiefly from one or two more inflamed and irritable than the rest, but smaller and less prominent, protruding just low enough to be compressed by the spincter muscle. He advises the removal of these hardened, inflamed, painful tumours by means of a hook and scissors, and supposes that those which remain will collapse and disappear. This practice, however, is by no means safe, and Mr. Petit records an instance of fatal hemorrhage from cutting off some internal hemorrhoids. The only hemorrhoidal tumours which I think it safe to cut off, are those which are completely external, and these should always be removed by the knife.

CHAPTER XXVI.

Of Prolapsus Ani.

A protrusion of a portion of the rectum, or of its internal coat, out of the anus, is denominated a prolapsus, or procidentia ani. In some cases a considerable portion of the intestine protrudes in this manner.

The causes of the complaint are such as tend to weaken the action of the muscles which support the intestine, and the violent exertions of the rectum in consequence of certain irritations. The frequent use of cathartics, especially those which contain aloes,—the presence of ascarides in the lower part of the alimentary canal,—habitual costiveness, and hemorrhoids, have all occasionally produced prolapsus ani. I have known it a consequence of the tenesmus attending dysentery.

In some instances the intestine remains a considerable length of time unreduced without any ill consequences, but more commonly it swells and inflames very speedily. It is therefore right to attempt as soon as possible the reduction of the prolapsed part, and this can be best done with the fingers of the surgeon, the patient being placed on his back with the nates elevated.

If the surgeon however be not called until the protruded intestine is swollen and inflamed, the attempt at reduction will be abortive; in which case the usual remedies for inflammation are to be employed. Bleeding, general and local, here become necessary. Leeches are to be applied to the swelling, after bleeding from the arm, and a soft poultice with lead water is to be applied to the part. The bowels if disordered are to be compos-

ed by opium. By these means the protruded rectum may in general be replaced, but the complaint is unfortunately very apt to return, and the chief difficulty is to prevent its recurrence.

Numerous bandages and machines have been contrived for this purpose ; one of the most ingenious is that of Mr. Bernard of Paris, who has constructed of the same materials as those which form the elastic catheters, a perforated pessary, which when introduced within the sphincter ani, prevents the prolapsus of the intestine, and permits the evacuation of the fæces. This instrument should be introduced after the reduction of the protruded gut, and kept in its situation until the irritation occasioning the prolapsus shall have subsided, after which it may be removed ; the softness of its texture, the smoothness of its surface, its elasticity and lightness, prevent it from giving much irritation. I have never had an opportunity of trying this instrument. To affect a permanent cure, the use of tonic and astringent remedies becomes necessary, and a careful abstinence from all those circumstances which produce the complaint.

Dr. Physick has succeeded in some cases in completely curing prolapsus ani, by confining his patients exclusively to a diet of rye mush and sugar, and the same remedy has proved equally beneficial in the hands of other practitioners.

During the use of such a diet, the bulk of the abdomen becomes considerably diminished, the bowels are kept constantly in a state somewhat loose, and all the fæces which are evacuated are of very soft consistence, circumstances which combine to lessen the effort of the abdominal muscles, and thereby to prevent the bowel from being protruded with the fæces.

Cases are recorded in which large portions of the alimentary canal have protruded at the anus. In the *Memoirs of the French Academy*, the case of a child is

related in whom a complete eversion of the colon took place; it began eleven inches from the anus, and terminated five or six inches outside of it. The eversion appeared to commence at the cœcum, and passed through the whole tract of the rectum. Other cases nearly similar have occurred. These however are instances of intus-susceptio, in an inordinate degree, and probably admit of no cure.

Prolapsus ani is most frequent in children, but sometimes occurs in adults. Mr. Hey has in some cases removed by the knife the pendulous portion of the rectum, and has in this manner effected a cure. The operation is however a severe one, and I would therefore recommend a long continued trial of Dr. Physick's method, before it is resorted to. Should this prove as successful in grown persons, as it has hitherto in children, there will be no necessity for so serious an operation as that performed by Mr. Hey.

Where prolapsus ani is produced by hemorrhoidal tumours, these ought certainly to be removed in the manner already directed.

CHAPTER XXVII.

Of Aneurism.

AN aneurism is a morbid dilatation of an artery. This definition does not however, include a species of aneurism denominated *spurious* or *false*, which arises from a wound or rupture of an artery whereby a cavity containing arterial blood is formed in the cellular texture surrounding the vessel.

This general division of aneurisms into true and false, has been unnecessarily complicated by subdivisions, which I shall not here enumerate, but shall describe in succession such varieties as are important to be known.

It was formerly a current opinion that whenever the coats of an artery became weakened at a particular spot, the usual force of circulation would dilate into an aneurism the debilitated vessel, and Dr. William Hunter imagined that if the external coats of an artery were cut through, the inner coat might be protruded and gradually dilating become an aneurismal tumour. This erroneous theory has, however, been completely subverted by the experiments of Mr. J. Hunter and Mr. Home, who dissected off the outer coats and adventitious support of an artery, and the internal coat alone being left, was found sufficient to continue the circulation without acquiring any increase of volume at the injured part. To prevent any accession of strength to the denuded vessel, it was prevented from contracting adhesions to the surrounding substance. The experiments therefore prove that aneurism does not depend upon *simple debility* of an arterial trunk.

Within a few years professor Scarpa has published a very interesting volume on aneurism, and has attempted to refute the received opinions respecting the nature of the disease, and to substitute in their room a doctrine of his own. He boldly declares, that all aneurisms arise from a wound or rupture of the inner coat of an artery, and consequently, that no such disease as *true aneurism* is to be found. The opinion of the learned professor, is delivered with an air of confidence, extremely imposing, and many surgeons have adopted it. “I have ascertained (says Scarpa) in the *most certain and unequivocal manner* that there is only one kind or form of this disease, viz. that formed by a solution of continuity or rupture of the proper coats of the artery with effusions of blood into the surrounding cellular substance, which solution of continuity is occasioned sometimes by a *wound*, a *steatomatous earthy degeneration*, a *corroding ulcer*, or a *rupture* of the proper coats (the internal and muscular) of the artery without the concurrence of a preternatural dilatation of these coats being essential to the formation of this disease, and therefore that every aneurism, whether it be internal or external, circumscribed or diffused, is *always formed by effusion*.”

The only argument advanced by Scarpa in defence of his novel opinion, is, the result of his individual observations; a very slender foundation certainly, upon which to ground so strong a conclusion. At most the dissections of the industrious anatomist only give a colour of plausibility to his doctrine, and by no means establish its correctness. After a very attentive examination of his cases and his remarks, I shall venture to record my total dissent from his opinion, which I cannot but believe to have originated in very imperfect views of the physiology and pathology of the absorbent system.

From Scarpa's dissections, from the observations of other anatomists, and from the dissections I have myself

made and witnessed, I have no doubt that aneurism is a disease seated in the proper coats of an artery, and that this disease speedily produces a change in the structure of the artery, generally, though not always attended by an enlargement at the diseased spot. The nature of the change I do not profess accurately to comprehend, but Mr. Hunter has proved that it precedes the dilatation of the vessel. I have a preparation at this moment before me, taken probably at a very early period of the disease, shewing in the clearest manner, an alteration in the structure of a large extent of vessel, which alteration Scarpa would doubtless call, a "steatomatous, earthy degeneration," but which in my mind evinces morbid action in the substance of the vessel, the coats of which are not absorbed, but are morbidly changed in texture.

Scarpa is unquestionably correct in stating the occasional ulceration of the vessel, and the removal of its coats by absorption, but this I maintain is a *consequence* of aneurism, and is to be considered an evidence of a previously morbid state. I have now on my table a preparation in which an aneurism of the aorta has occasioned an absorption of part of the sternum, of the cartilages, of several ribs, and of almost every solid part in the vicinity of the vessel, and such cases are by no means rare. Now Scarpa's dissections have been made at a point of time when this business of absorption was commencing, and very probably he is correct in observing that sometimes the first part absorbed, is the inner coat of the artery, but assuredly if this be the case, that coat was in a diseased state, and was removed like any other dead or morbid matter.

All therefore which the learned anatomist has proved, is, that the proper coats of the artery are absorbed in aneurisms, but this, I have no doubt, is a consequence, and not a cause, of the disease, and I think it probable that the removal of the inner coat by absorption, does

not take place until it has been considerably distended and augmented in diameter.

Mr. Richerand in commenting upon Scarpa's doctrines, pronounces them utterly unworthy of his high character, an opinion in which I fully concur, and am led to retain the usual division of aneurisms into true and false; and I honestly think, that nothing can be more obvious than the totally distinct nature of the two cases; the one consisting in disease; the other resulting from accident.

A TRUE ANEURISM commences with an unusual throbbing, and a small tumour at the affected part; by pressure the swelling disappears, but returns immediately when the pressure is removed. If the artery be compressed between the aneurism and the heart, the tumour also subsides, and is reproduced by taking off the pressure. The tumour is unattended with inflammation, no pain or redness being visible. Gradually augmenting in size it attains a very great volume, and the pulsations generally become less evident, and in some cases they are quite obscured, a circumstance generally ascribed to the diminished action of the distended vessel, and to coagulated blood, of which a considerable portion is contained in the aneurismal cavity, through which the pulsations of the vessels are less readily felt. In a large aneurism it is generally impracticable entirely to remove the tumour by pressure, in consequence of the coagulated blood lining its cavity.

The circulation of blood through the branches of the aneurismal vessel becomes enfeebled, and these branches are sometimes found of a smaller size than natural.

In the progress of an aneurism, oedema is sometimes occasioned, and caries of the neighbouring bones. The disease, when seated in a large artery and left to itself, terminates in death. The substance surrounding the tumour becomes absorbed in consequence of pressure, car-

tilages, and even bones, in contact with the aneurism, are removed, and in many cases upon dissection the cavity of the aneurism appears to be formed by the surrounding parts, all vestige of arterial structure being lost, and a large portion of the neighbouring texture destroyed. At length the integuments become thinned, and the aneurism bursts, either from some unusual exertion, producing a rupture of its parietes, or from the formation of a slough or gangrenous eschar at the external part of the tumour, an immense flow of blood follows, and terminates the existence of the patient.

All the arteries are subject to aneurism: it is frequently seated at the curve of the aorta, and the larger arteries are much oftener affected with it than the smaller, but not in strict proportion to their size; next to the aorta, the popliteal artery is perhaps most subject to aneurism.

The causes of aneurism are not very clearly known. It is not uncommon for an arterial trunk to be found affected with aneurism in several situations, and in these patients the vessel, when it is not yet dilated, is seen spotted, in various places, as if with small masses of cartilage. Mr. Pelletan has counted sixty-three, of various sizes, in one man.*

OF THE TREATMENT OF TRUE ANEURISM.

Scarpa with his usual confidence states it as “a certain and incontrovertible fact in practical surgery that a complete and truly radical cure of aneurism cannot be obtained in whatever part of the body this tumour is situated, unless the ulcerated, lacerated, or wounded artery, from which the aneurism is derived, is by the assistance of nature, or of nature combined with art, obliterated, and

* “J'en ai compte soixante-trois sur un seul homme depuis le volume d'une aveline jusqu'à celui de la moitié d'un œuf de poule.” *Clinique Chirur.* tom. ii.

converted into a perfectly solid ligamentous substance, for a certain space above and below the ulceration, laceration, or wound.” This fact asserted by Scarpa with respect to all aneurisms is perhaps true with respect to true aneurism, and it has been the custom to consider these cases as beyond the reach of surgery, unless in cases where the diseased artery can be secured and its cavity obliterated by the application of a ligature; a low diet and occasional bloodlettings were considered as remedies likely only to palliate the complaint.

Valsalva, however, appears to have entertained more sanguine expectations, and has accordingly carried this plan to a greater extent by copious and repeated bloodlettings and by a very abstemious diet. I have not been able to see his work, but in the valuable memoir of Mr. Pelletan upon internal aneurisms several cases are recorded, which the author pronounces positive cures, effected by the mode of treatment recommended by Valsalva. Some idea may be formed of the extent to which depletion was carried in these cases from the following passage. “During the first four days I prescribed eight bleedings of three *bowls** in the morning and two in the evening. The fifth day the pain and pulsation were much diminished, but the pulse preserved its fulness and two bowls of blood were taken at one bleeding. The pulse remained in a favourable state of weakness till the seventh day, when it became more tense, and the patient lost one bowl of blood in the morning and one in the evening.”†

During this time the patient was kept to a very rigorous diet. In twenty-eight days the patient left the hospital (contrary to the advice of his surgeon) but he never after had a symptom of aneurism.

* The term *palettes* which I have translated *bowls*, generally signifies four ounces, so that three bowls or porringers, implies twelve ounces.

† Clin. Chir. tom. 1. p. 73.

Although I would not be sanguine in my expectations of curing an aneurism of the aorta, yet the testimony of Mr. Pelletan is so respectable that his treatment is unquestionably worthy of imitation.

The general indication to be regarded in the treatment of aneurism is to effect an obliteration of the diseased vessel. This has been done occasionally by pressure, and in some instances a spontaneous cure of aneurism has taken place in consequence of the pressure from the tumour which has effectually precluded fresh blood from the aneurismal cavity, and has produced adhesions in the inner coat of the vessel which have entirely closed up its cavity. Such an event is however very rare, and the effects of pressure are by no means certain. Guattani unquestionably succeeded in many cases by compression, and Mr. Freer in his experiments on horses has proved that compression, may be so applied as to effect the obliteration of a healthy artery. He recommends pressure upon a sound part of the artery above the aneurism. The best mode of treatment, however, is to tie up the artery at such a distance above the aneurism that the ligature may act upon a healthy portion of the vessel, and thus produce adhesion at that spot; a practice introduced by Mr. Hunter, and founded upon the ill success attending the application of ligatures upon the diseased vessel and the frequent and fatal hemorrhages resulting from that imperfect mode of treatment. He expected that if the artery were tied above the diseased part, the aneurismal tumour would cease to enlarge, and be ultimately removed by absorption.

Mr. Hunter's first operation was performed in 1785, in a case of popliteal aneurism, and we shall therefore describe this particular aneurism first. It is the most frequent case demanding the surgeon's attention, and the principles which direct his practice in this can readily be applied to aneurisms in other situations.

OF POPLITEAL ANEURISM.

In this case the tumour may be felt pulsating strongly in the space between the hamstrings. It occurs most commonly in coachmen, and the general character of aneurism is distinctly evident.

When the operation is to be performed the patient is laid on a table, and a tourniquet placed round the upper part of the thigh; an incision four inches long is then made on the anterior and inner part of the thigh rather below its middle, and this wound is continued obliquely across the inner edge of the sartorius muscle. The fascia covering the artery is next to be laid bare, and the vessel can then be very plainly felt. The fascia is now to be cut through along side of the artery, and the vessel is thus completely exposed. An aneurismal needle (a small blunt silver bodkin, curved to the shape of the common needle) armed with a strong double ligature of waxed thread, or strong bobbin, is to be passed round the artery. The ligature being cut at the eye of the needle, two strong ligatures are left round the artery, and both these are to be firmly tied the one an inch higher than the other, after which the artery is to be divided with a bistoury between the two ligatures, an improvement introduced by Mr. Abernethy, for reasons to be noticed presently.

This operation differs in some respects from Mr. Hunter's, but I have preferred a description of what I consider the best method, to a long detail of each successive improvement which the operation has undergone.

The wound is to be dressed with adhesive plaster and the patient confined to bed. In general the ligatures come away between the twelfth and twentieth days and the aneurismal tumour is gradually absorbed, or forms an abscess, and after a free suppuration gets well.

The operation of Mr. Hunter for popliteal aneurism, in some instances terminated in fatal hemorrhage, and Mr. Abernethy ascribed this unfortunate event first to the inflammation and ulceration of the artery, and secondly to the want of union between the sides of the vessel. From observing that the blood-vessels of an amputated limb were less apt to bleed than the femoral artery when tied for the cure of popliteal aneurism, Mr. Abernethy was led to place this artery in the same situation, by applying two ligatures and dividing the vessel between them. In this manner the tension of the vessel is lessened, a retraction takes place, and the vessel contracts adhesions to the surrounding parts, and in the opinion of Dr. Jones founded upon very numerous experiments on brutes, the plan of Mr. Abernethy is safest and best. We should recollect in tying so important a vessel, the doctrines of hemorrhage developed by Dr. Jones, and never neglect to tie the artery as closely as possible to its natural connexions, and never to apply a ligature upon the vessel in a situation in which it is denuded to any considerable extent.

Mr. Astly Cooper in performing the operation in the manner of Mr. Abernethy, found that both the ligatures were forced off, and the divided artery was left which would have inevitably occasioned fatal hemorrhage had the surgeon been absent. Mr. Cline met with a similar case, and his son, Mr. Henry Cline, contrived a plan for preventing the recurrence of such an accident, which consists in passing each ligature, by means of a curved needle, through the cut extremity of the artery.

I doubt very much the necessity of this refinement, and believe that wherever the ligatures are tied sufficiently tight to divide the inner coat of the artery there will be no reason to dread the slipping off of the ligature. At least I have never seen a case in which the accident has occurred.

OF FEMORAL AND INGUINAL ANEURISMS.

The operation last described may be performed in cases where the aneurism is situated near the knee, but the femoral artery is occasionally diseased considerably higher up, and in these cases it is equally necessary to tie the artery in a situation remote from the disease. If this can be done in any place below the groin the operation differs in nothing essential from the one just described. It, however, in some cases happens that the aneurismal tumour is situated in the groin, and then it becomes necessary to tie up the trunk of the external iliac artery within the pelvis, an operation first performed by the intrepid Abernethy, and subsequently by several other surgeons. As I have myself met with such a case and treated it successfully I shall copy the account of it published in the *Eclectic Repertory*, as the best method of describing the operation.

With respect to the proper time for performing the operation, in this and most other instances it is safest to operate early, because the advantages which some surgeons have expected from delaying it until the anastomosing vessels are enlarged, is more than counterbalanced by the danger of an extension of the disease.

CASE.

On the 15th of August 1811, I was consulted by Alexander Patton, on account of a tumour in his right groin. The patient was a native of Aberdeenshire in Scotland, aged about thirty years, the last ten of which he had passed in America. He followed the trade of a cooper; was accustomed to hard labour, and to athletic exercises, jumping, running and the like. He was six feet in height, of a robust but not corpulent habit.

Two years ago he perceived, for the first time, a small tumour in the right groin. Having never had the venereal, nor indeed any other disease, and not having met with any accident, he was at a loss to account for this appearance. From its commencement it throbbed with considerable violence. For a year and four months it increased very slowly; during the last eight months much more rapidly. In January it was no bigger than a walnut; in August its shortest diameter was four inches, its longest, nearly five. It occasionally gave him severe pain, and at length incapacitated him from all labour. In June last (1811) he applied to Dr. Irwin of Easton, the place of his residence, who instantly apprized him of the nature and importance of the complaint, and advised him to come to Philadelphia. He arrived here the 14th of August, and was admitted next day into the Pennsylvania hospital.

On examination, an aneurism was found, situated immediately below Poupart's ligament, forming a regular tumour in the groin, nearly hemispherical, with a kind of apex, where the skin appeared extremely thin, and discoloured as if by ecchymosis. The patient had used a good deal of exercise previously to his admission into the hospital, and had taken a drink of rum, in consequence of which his arterial system was greatly excited, and the tumour pulsated so violently that the bed clothes were bounced up with great force. He was confined to bed, was purged, and kept to a low diet. A consultation was called; and the surgeons of the house concurred in recommending the operation of tying the artery as high as practicable above the tumour. It was determined to perform the operation promptly; as the disease was progressing, and no benefit was to be expected from delay.

On Monday 19th of August, at noon, in presence of Dr. Physick and Dr. Hartshorn, surgeons to the hospital,

and a number of medical gentlemen, I proceeded to the operation. The patient, having previously taken fifty drops of laudanum, was placed on the table. An incision three inches and a half long, was made, beginning an inch and a half higher than the superior anterior spinous process of the ilium, and one inch distant from that process internally; being also four inches and a half distant from the umbilicus, extending obliquely downward and terminating about one inch above the basis of the tumour. This incision, which was nearly in the direction of the fibres of the tendon of the external oblique muscle, divided the skin and adipose membrane, and exposed that tendon, which was next cut through, the whole length of the external incision. The internal oblique muscle now protruded at the wound and was carefully cut through; the inferior edge of the transversalis abdominis was next divided, but not so far upward as the top of the external wound. My finger was then introduced, and the cellular texture readily yielded it a passage to the external iliac artery, the trunk of which I distinctly felt pulsating very strongly. With my finger I separated it gently from the neighbouring parts; but took care to denude only a very small portion of the vessel. The peritoneum I was equally careful to detach as little as possible; and not more than a square inch of it was disturbed. The only remaining difficulty in the operation was to pass the ligature round the vessel; and this having been anticipated, was readily surmounted. Before commencing the operation, I had secured an aneurismal needle (a blunt bodkin of silver properly bent) in a pair of curved forceps, by tying the handles of the forceps firmly together. The needle was armed with strong bobbin; and thus connected with the forceps, resembled a tenaculum, which could easily be managed outside of the wound. With one finger in the wound I found it very easy to direct the extremity of the needle,

and with the forceps in my other hand, to push it through the fascia surrounding the vessel. The string connecting the handles of the forceps was now cut, and the needle was left under the vessel. The forceps being removed, the needle was drawn out, leaving the ligature round the artery. Convinced, by careful examination, that nothing but the artery was included in the ligature, and that it was, to the best of my judgment, natural in size and texture, I tied it very firmly, as high up as possible. The pulsation of the tumour instantly ceased. Three knots were made, and the ends of the ligature were left out at the external wound. No blood-vessel of magnitude was divided, and not half an ounce of blood was lost. No stitches were employed to close the wound; a strip of adhesive plaster effectually answered this purpose. A pledget of lint was applied, and the patient was put to bed, his thigh being moderately flexed upon the pelvis. He complained of extreme pain during the latter part of the operation, the whole of which occupied eleven minutes.

The patient's pulse, for several days before the operation, was 80: after the operation it was 88, and rose in the afternoon to 100. At four o'clock he was bled ten ounces. At seven he complained of extreme pain in the back and belly, and also of some pain in the limb. He was not permitted to take any sustenance except toast and water. The superficial veins of the leg and foot were filled; and the whole of the limb was covered all the evening with perspiration. Its temperature was examined repeatedly by a thermometer, and was five degrees colder than the other. It was covered with flannel and carded wool.

Tuesday 20th. Passed a restless night, in great pain. To use his own language, in expressing his sensations, "he felt as if his loins were tearing apart." He was also troubled with pain of the bowels. Three grains of

calomel and ten of rhubarb were given, but without procuring a stool. In the afternoon he was bled ten ounces, and a purgative injection was ordered; after which his bowels were freely opened, and his pain subsided. An enema, consisting of a hundred drops of laudanum and two ounces of water, was administered, and he soon after fell asleep. The weather, on the day of the operation and several days after, was very hot. The mercury of the thermometer in the patient's room stood at 86° Fahrenheit. Placed between the toes of the aneurismal limb, it rose to 88° ; between those of the sound limb 90° ; at both knees it stood at 92° . His pulse was 100 and tense.

Wednesday 21st, *third day* after the operation. The sleep procured by the anodyne injection continued all night. In the fore part of the day he was easy; but in the evening his pain returned with considerable fever. He was bled ten ounces and took ten grains of magnesia and as much rhubarb: this with the assistance of a clyster, brought away a large quantity of fæces and flatus, and procured relief of all his pain. The anodyne injection was again administered, and he soon after slept. His pulse 100 and somewhat tense.

Thursday, *fourth day*. He slept all night, and was much better; being quite free from pain and fever. His pulse 90. He ate some boiled rice with great relish. The wound was examined, and it was found that nearly all of it had united; a little healthy pus surrounded the ligature. The limb was four degrees colder than the sound one.

From this time no change of importance occurred until Sunday, 1st Sept. when the ligature came away; viz. on the fourteenth day after the operation. In a few days more the wound cicatrized, without the occurrence of a single unpleasant symptom. On the twentieth day after the operation, his nurse being absent, he arose from bed

and walked across the room, and has taken exercise every day since without inconvenience. The tumour in the groin diminishes slowly, and at this time is much reduced in size.

REMARKS. The operation of tying up the external iliac artery above Poupart's ligament was first performed by Mr. Abernethy, under circumstances in which immediate death was the only alternative. He repeated it afterwards in cases of aneurism seated so high in the femoral artery as to preclude all prospect of a cure by any other means. He performed the operation four times. In the first two instances his patients died; in the succeeding cases they recovered.* Mr. Freer, in the Birmingham hospital, performed the operation in a case of inguinal aneurism with complete success; and soon after another case was treated successfully by Mr. Tomlinson, of the same hospital.† These six cases are all that I have seen related, in which the operation has been tried. The case I have now detailed is the seventh; and it has failed in only two of these. In every instance the limb has been supplied with blood, which does not uniformly happen after the operation for popliteal aneurism.

I wish, before closing this paper, to call the attention of those surgeons, who may have occasion to perform the operation, to the forceps, of which an engraving is annexed. This instrument was contrived several years ago by Dr. Physick for the purpose of passing a needle under the pudic artery, when wounded in lithotomy, and has since been used by him for securing bleeding arteries in deep narrow wounds. Mr. Abernethy complains of "the great difficulty of turning a common needle in a deep narrow wound;" and Mr. Freer was unable to pass his aneurismal needle round the iliac artery, until he punctured the fascia surrounding it with his knife, which

* Abernethy's Surgical Observations

† Freer on Aneurism

he confesses was the most "difficult and dangerous part of the operation." These dangers and difficulties are entirely obviated by means of the curved forceps; and I think the operation greatly simplified by the use of this contrivance.

Should this paper meet the eyes of Mr. Abernethy, I hope he will be gratified with the additional testimony of the importance of an operation for which the world is indebted to the intrepid efforts of true genius; and he will no doubt learn with pleasure, that one individual on this side the Atlantic owes to it, his life.*

To this account I have only to add that the operation has been since performed in Dublin and in London with success; it certainly affords a strong proof of the courage derived from our increased knowledge of the resources of the animal œconomy. The extent to which anastomosing vessels are capable of enlarging when a main artery is obliterated, is perhaps not yet fully developed. Mr. Astly Cooper has made some experiments upon dogs, by which it appears that the aorta, both carotids, and the subclavian arteries may be tied up without destroying the life of the animal. The operation has now been done in more than thirty cases, and has succeeded in a large majority.

OF ANEURISM OF THE CAROTID ARTERY.

In November 1805, Mr. Astly Cooper tied up the carotid artery in a case of aneurism, and though the patient died on the twenty-first day, she had lived long enough to prove that her death did not result necessarily from the operation. Mr. Cooper repeated it therefore on a porter aged fifty, upon whom it succeeded

* The adjoining sketch is intended to point out the part where the operation was performed, and the instrument used to convey the ligature round the artery. It needs no particular explanation.



INGUINAL ANEURISM.



completely, and the patient was cured. Dr. Baillie and Mr. Hunter many years ago thought the success of this operation not improbable, but protested against it except in cases of absolute necessity.

The following case extracted from Mr. Cooper's publication will prove sufficiently descriptive of the disease and operation.

The dilatation of the carotid artery was seated just below the angle of the jaw, and about the acute angle which is made by the great division of the common carotid. The tumour was about the size of a pullet's egg, and prominent in its middle.

The pulsation of the aneurism on the day of the operation was remarkably strong; when the sac was emptied by pressure on the artery below, the tumour sprang to its original size with one contraction of the heart.

Mr. Cooper proposed to tie the common carotid below the dilated part, and the operation was performed at one o'clock on the twenty-second of June, 1808, at Guy's Hospital.

He began his incision opposite the middle of the thyroid cartilage from the base of the tumour, and extended it to within an inch of the clavicle, on the inner side of the mastoid muscle. On raising the margin of this muscle, the omo-hyoideus could be distinctly seen crossing the sheath of the vessels, and the nervus descendens noni was also exposed. He next separated the mastoid from the omo-hyoideus muscle, and the jugular vein became apparent, which, being distended at every expiration spread itself over the artery. Drawing aside the vein, the par vagum was evident, lying between it and the carotid artery, but a little to its outer side. This nerve was easily avoided.

A blunt iron probe constructed for the purpose was then passed under the artery carrying a double ligature with it. Two ligatures being thus conveyed under the

artery the lower was immediately tied. Mr. Cooper next detached the artery from the surrounding parts, to the extent of an inch above the lower ligature, and then tied the upper. Lastly a needle and thread were passed through the artery above one ligature and below the other. The division of the artery was then performed.

Nothing now remained but to dress the patient and this was done by drawing the parts together by adhesive straps, the ligatures hanging from each end of the wound, and by laying on a piece of lint retained by straps of adhesive plaster.

After the operation the patient felt relieved from a headache which had accompanied the formation and growth of the tumour, and which never afterwards returned. The pulsation of the tumour, however, did not entirely cease in consequence as Mr. Cooper supposed, of the return of blood by the internal carotid artery from the brain.

This patient happily recovered ; a cough and hoarseness came on and continued a long time ; on the twenty-third day the upper ligature came away, and on the twenty-fourth the lower, and soon after the wound healed, the patient was discharged cured, and the tumour gradually disappeared.

Mr. Cooper thinks that the aneurism in the preceding case was situated in the internal carotid artery, a circumstance which led him to hope that the regurgitation of the blood, although at first sufficient to excite a slight pulsation in the tumour, would not continue to support its growth, because as the internal carotid artery passes through a foramen in the skull, a little above where the swelling was situated, it could not dilate at that part to bring down any additional quantity of blood into the sac, so that its first effect was likely to be as great as any it could produce. But if the aneurism had been of the external carotid artery, owing to the number of communi-

cating vessels, he would not have been equally sanguine in his expectation that the pulsation would have ceased.

I have great pleasure in subjoining the following very interesting case in which the carotid artery was tied up successfully by Dr. Post of New York, a gentleman long distinguished as one of our ablest surgeons.

PETER THOMAS aged thirty-five, a native of the West Indies, was admitted into the New York Hospital January fifth 1813, with a large aneurism of the carotid artery, situated immediately below the angle of the jaw on the right side.

The account which he gave of himself was as follows. In March 1812, he first experienced a pulsatory sensation in the neck, but at this time there was no visible tumour. A tumour was, however, soon after discovered on examination, which very slowly and gradually increased in size, until about two months since, when it began rapidly to enlarge. Previously to its last enlargement, he experienced no pain in it; but now complains of an unpleasant throbbing sensation, and has lately had several attacks of vertigo.

He had been bled from the arm sometime before his admission into the Hospital, and by some ignorant practitioner, had had several blisters applied to the tumour.

He had never laboured under any severe indisposition, and his constitution was robust and plethoric. For some considerable time before the discovery of the tumour, he had been occupied as a labourer to attend upon masons, and of course in this capacity, was frequently necessitated to carry very heavy loads upon his shoulders to a great height. In this employ too, the frequent inclination of the body forward would greatly favour a determination of blood to the head.

The tumour upon being accurately measured at this time was found to possess the following dimensions.

	INCHES.
Length - - - - -	6 $\frac{1}{2}$
Breadth - - - - -	4
Height or projection from the neck more than - - - - -	2
Half circumference - - - - -	8 $\frac{1}{2}$

Being of a full habit of body with a strong pulse, he was bled from the arm to ℥xvj , took some cathartic medicine, and was ordered to live upon a light diet, to diminish arterial action.

On the seventh of the month a consultation was held, when it was agreed to take up the carotid artery below the tumour, as affording the best chance of success in the case. The patient, anxious to be relieved, willingly submitted to the operation, and it was performed on the ninth at 12 o'clock, by Dr. Post, in the presence of a large number of professional gentlemen in the following manner:

An incision was made from the lower part of the tumour to within a very small distance of the clavicle, of about three inches in length. This laid bare the inner edge of the sterno-mastoid muscle, and by cautiously dividing the cellular substance, the sterno-hyoideus and the sheath containing the vessels, were exposed. The sheath was then divided, and the artery separated from the vein and par vagum. This part of the operation was done with great caution, sometimes using the edge and sometimes the handle of the scalpel, to avoid injuring either of these important vessels. An eyed probe properly curved and armed with a round ligature, was passed under the artery. The ligature was then divided, and the lower one tied, and after detaching the artery about three-fourths of an inch from the lower ligature, the upper one was tied. Both ligatures being previously armed with a small crooked needle, the lower one was

passed through the artery above the ligature, and tied a second time as recommended by Henry Cline jun. of London. The artery between the ligatures was then divided with a bistoury.

It was not deemed necessary to pass the upper ligature through the artery, as there could be but little or no danger of its slipping off; the force of the circulation being altogether resisted by the lower one; though the artery was at least one third larger than natural, and the coats uncommonly thickened.

As soon as the first ligature was applied, the pulsation in the tumour entirely ceased; but in the course of an hour afterwards, upon being attentively examined, an obscure pulsatory or undulatory motion was discoverable.

About two minutes after the first ligature was applied, one of the gentlemen present having his fingers upon the pulse at the wrist from the commencement of the operation, observed a sudden diminution both of frequency and force in the stroke of the artery, so that it could scarcely be felt at all, and yet there was no appearance of syncope. In about five minutes, however, it was restored to its former standard. The patient complained at this time, of a pressing, or sense of weight in the right inferior extremity, the right arm was very much relaxed, fell from the side of the body, and seemed deprived of the power of motion. These symptoms, however, immediately disappeared with the return of the energy of the circulation.

The wound was dressed by drawing the parts accurately together by straps of adhesive plaster, with the ligatures hanging from each angle of it; and over these a piece of lint retained by adhesive plaster. No bandage was applied. The man was then carried to his bed, and had his head and shoulders considerably elevated.

About three hours after the operation he complained of oppression about the upper part of the chest, and some pain in the right side of the head, though not of the throbbing kind which he felt before the operation. As he complained also of chilliness and cold feet, accompanied with a small and feeble pulse, he was ordered a draught of Aq. Ammon. Acetat. and Tinct. Opii—to drink freely of tepid drink, and have warm applications to his feet. By 10 o'clock in the evening he felt very comfortable, except a little pain in the head—Pulse 70, full and soft.

Next day, January tenth—Morning. Slept very well during the latter part of the night, and at present feels no uneasiness except a little in the head—Pulse 70 and full—was bled to ℥xij —Four o'clock P. M. pulse 80, and full, in other respects much as in the morning. At ten in the evening his pulse being 84, strong, full and in some degree hard, with white tongue, and an increase of temperature of the skin, he was bled to ℥x more.

January eleventh. Complains of stiffness and some uneasiness about the throat, but has no pain. Having had no alvine evacuation since the operation, was ordered the Tart. Potas. and Sodæ in divided doses—Pulse 86.

January twelfth. The purgative operated very well. Early this morning after an attack of coughing, he fell into a state of syncope, which lasted several minutes; on recovering he complained of an uneasiness about the throat, and a difficulty in throwing up the mucus from the fauces—Pulse frequent and feeble, skin cold and covered with a copious perspiration—Ordered a more nourishing diet—Evening—Pulse 94 and moderately full—feels no pain except in the wound—Tumour does not appear quite so prominent as before, is harder to the feel—pulsation very obscure.

January thirteenth. Passed a comfortable night—Is troubled occasionally with fits of coughing, for which he was ordered Tinct. Opii. gtt. x in ℥ss. Sol. Glycyrrh. every two hours. The frequent fits of coughing have so deranged the dressings, (though they have been frequently re-applied) that no union by the adhesive inflammation has taken place, but suppuration is coming on. Pulsation almost imperceptible.

January fourteenth to twentieth. The cough was at times very harassing. The pain in the right side of the head, and on the lower part of the neck continued to be more or less troublesome. The bowels were kept free with saline cathartics, and the cough moderated by anodynes and demulcents.

January twenty-second. The wound is granulating and healthy—the cough less troublesome. The dimensions of the tumour are as follows:

						INCHES.
Length	-	-	-	-	-	5 $\frac{3}{4}$
Breadth	-	-	-	-	-	3 $\frac{1}{2}$
Projection	-	-	-	-	-	2
$\frac{1}{2}$ Circumference	-	-	-	-	-	7 $\frac{3}{4}$

January twenty-fourth. The upper ligature came away with the dressings.

January twenty-sixth. The lower ligature came away. The sore has very much contracted, and discharges but little.

February second. The patient's general health is good. There is no pulsation in the tumour except at one part, where it is softer, and here it is very indistinct.

February twenty-second. The wound is reduced to a small sinus of an inch and a half in depth—At a soft prominent point, near the lower part of the tumour, an obscure pulsation is still perceptible.

March twenty-third. Injections have been made of Sulphate of Zinc and Sulphate of Copper into the sinus, which is now very much contracted. The measurement of the tumour to day gives the following result.

						INCHES.
Length	-	-	-	-	-	$4\frac{1}{4}$
Breadth	-	-	-	-	-	$2\frac{3}{4}$
Projection	-	-	-	-	-	$1\frac{1}{2}$
$\frac{1}{2}$ Circumference	-	-	-	-	-	$6\frac{1}{2}$

May seventeenth. The sinus has been well for some days—DISCHARGED CURED.

Dr. Post saw the patient on the fifth of June when the general prominence of the tumour did not appear to have diminished since the last measurement; the upper part was lessened, so as to leave a considerable space between it and the angle of the jaw—the lower part had approached so near the clavicle as to have the cicatrix in part upon it. Dr. Post was of opinion that had the tumour been situated as close to the clavicle before the operation, there would not have been room enough to have taken up the artery.

Dr. Post has since operated on another case of carotid aneurism, and the tumour having been reproduced by anastomising vessels, he intends to tie up the other carotid of the same patient. I feel no small share of interest in the result, and am truly solicitous that success may crown so enterprizing an effort.

Mr. Charles Collier took up the carotid artery, to prevent a fatal hemorrhagy from a wound in the mouth; and Mr. Goodlad tied it up previously to removing a tumour from the face and neck, in neither case did any serious consequences result.

ANEURISM OF THE AXILLARY ARTERY.

Another situation in which aneurism sometimes occurs

is in the axillary, or high in the brachial artery. The usual symptoms of aneurism generally attend this case, but Mr. Pelletan relates an instance in which no arterial pulsation could be discovered, and the tumour was mistaken for an abscess; a puncture being made a gush of arterial blood announced the nature of the disease, and though the puncture was healed yet the mistake had nearly proved fatal. Of late years the success of those daring operations already described has encouraged surgeons to tie up the subclavian artery in cases of axillary aneurism.

In the year 1786, before the successful performance of any of these operations, however, a case of axillary aneurism occurred in the practice of Mr. Pelletan, who received the patient "more with a view to study his disease than with a hope of curing it." He found after many examinations of this patient, that upon raising the arm and clavicle he could distinctly feel the subclavian artery, in a manner insulated, and by compressing it with the finger the pulsations of the tumour were immediately stopped. He accordingly determined to tie up the artery in this situation.

It appears from Mr. Pelletan's candid and very interesting account of his operation that he was prevented from carrying his own plan into effect, and therefore he made an unsuccessful attempt to take up the vessel, and the patient soon after expiring, gave him an opportunity to prove by dissection the practicability of tying up the subclavian artery in such a situation as to have cut off all access of blood to the tumour. Mr. Pelletan suggests the propriety, in cases where this is totally impracticable, of tying the artery below the tumour, under an expectation that the course of the blood being interrupted through the main channel, another route would be established and the progress of the disease arrested—an idea totally improbable, and an operation by no means likely to

succeed. Desault also tied the axillary artery without success.

That the mere obstruction of the subclavian artery will not necessarily occasion gangrene of the arm is demonstrated by a case recorded by Mr. Hall, in which this artery was divided by a sithe and being taken up the patient recovered, and regained the use of his arm.

Mr. Keate has detailed so far as I know the first case in which an axillary aneurism has been successfully treated by a ligature on the subclavian artery. This patient was a soldier twenty-five years of age. In October 1799 he was wounded in the hand, and three fingers were amputated. The stumps did not soon heal and collections of matter formed near his wrist—an aneurismal tumour was soon after found in the axilla which became very prominent and was attended with a strong pulsation. The parietes of this aneurism became extremely thin, and at length were ruptured, and the hemorrhage for a time was commanded by pressure. In this situation Mr. Keate determined to take up the artery in its passage over the first rib. Accordingly he made an incision obliquely downwards, divided the fibres of the pectoral muscle that lay in his way, and when he came to the artery he passed a curved blunt pointed silver needle armed double, as he conceived under the artery, and tied two of the ends; after a careful examination he found that the artery pulsated below the ligature, and he determined to pass another ligature higher up and nearer to the clavicle. He accordingly passed the needle deeper evidently including the artery. This operation proved completely successful, no gangrene resulted, and the patient gradually acquired the use of his arm as well as before the accident.

Mr. Ramsden of London has published a case in which the subclavian artery was tied up, and although the event was fatal yet the mode of operating is des-

cribed so clearly that I shall relate the principal circumstances of the case.

The patient was twenty-two years of age—a perfect sot. The tumour was as large as half of an orange. Pulse and temperature in both arms similar. He had not remained long in St. Bartholomew's Hospital before a dark spot appeared on the centre of the tumour indicative of gangrene, and the operation was accordingly performed in the following manner.

The patient being placed upon an operating table with his head obliquely towards the light and the affected arm supported by an assistant at an easy distance from the side; I made" says Mr. Ramsden "a transverse incision through the skin and platysma myoides along and upon the upper edge of the clavicle of about two inches and a half in length, beginning it nearest to the shoulder, and terminating its inner extremity at about half an inch within the outward edge of the sterno-cleido-mastoideus muscle. This incision divided a small superficial artery, which was directly secured. The skin above the clavicle being then pinched up between my thumb and finger and those of an assistant, I divided it from within outwards and upwards in the line of the outward edge of the sterno-cleido-mastoideus muscle to the extent of two inches.

"My object in pinching up the skin for the second incision was to expose at once the superficial veins, and by dissecting them carefully from the cellular membrane to place them out of my way without wounding them. This provision proved to be very useful, for it rendered the flow of blood during the operation very trifling comparatively with what might otherwise have been expected; and thereby enabled me with the greatest facility to bring into view those parts which were to direct me to the artery.

“My assistant having now lowered the shoulder* for the purpose of placing the first incision above the clavicle (which I had designedly made along and upon that bone), I continued the dissection with my scalpel until I had distinctly brought into sight the edge of the anterior scalenus muscle, immediately below the angle, which is formed by the traversing-bellies of the omohyoideus and the edge of the sterno-cleido-mastoideus, and having placed my finger on the artery at the point where it presents itself between the scaleni, I found no difficulty in tracing it, without touching any of the nerves, to the lower edge of the upper rib, at which part I detached it with my finger nail, for the purpose of applying the ligature.

“Here however arose an embarrassment which (although I was not unprepared for it) greatly exceeded my expectation. I had learned from repeatedly performing this operation many years since on the dead subject, that to pass the ligature under the subclavian artery, with the needle commonly used in aneurisms would be impracticable; I had therefore provided myself with instruments of various forms and curvatures to meet the difficulty, each of which conveyed most readily the ligature underneath the artery but would serve me no farther; for, being made of solid materials, and fixed into handles, they would not allow of their points being brought up again at the very short curvature which the narrowness of the space between the rib and the clavicle afforded, and which in this particular case was rendered of unusual depth by the previous elevation of the shoulder, by the tumour.

“After trying various means to overcome this difficul-

* “In my first incision I intentionally cut down along and upon the clavicle, as a security against wounding any superficial vessels, a very little lowering of the shoulder therefore placed the incision in the situation I wished to have it for the purpose of proceeding with the operation.”

ty, a probe of ductile metal was at length handed me, which I passed under the artery, and bringing up its point with a pair of forceps, I succeeded in passing on the ligature, and then tied the subclavian artery at the part, where I had previously detached it for that purpose. The drawing of the knot was unattended with pain, the wound was closed by the dry suture, and the patient was then returned to his bed."

Mr. Ramsden's patient died on the fifth day after the operation, but the practicability of the operation is demonstrated by the case, and there occurred nothing in the subsequent symptoms to forbid a similar attempt in a similar instance.

With respect to the best situation in which to apply the ligature in the present instance, that must be decided by the nature of the case, and the size and situation of the tumour—the most accessible part of the sound artery is to be preferred. To find this spot there are no directions necessary; an accurate knowledge of the anatomy of the parts is indispensable, but the surgeon will always recollect one material difference between the living and dead body, too much overlooked, the pulsation of the artery, which in operations for aneurism is a most important guide.

Having never performed the operation upon the living subject I speak diffidently as to the best method, but I have no doubt that the needle in curved forceps such as I have recommended in tying the pudic and iliac arteries, would greatly facilitate the passing of a ligature round the subclavian.

OF TYING THE ARTERIA INNOMINATA.

A case has recently occurred in which Dr. Mott, professor of surgery, in the university of New York, secured the arteria innominata. An account of this opera-

tion will speedily be published, and the medical world will then be enabled to estimate their obligations to this intrepid surgeon, who has certainly demonstrated that the circulation in the arm will not be necessarily destroyed by securing this vessel ; his patient having survived the operation nearly four weeks.

I heartily regret the fatal result of this operation, which promised to throw additional lustre on American surgery, and on the distinguished name of the gentleman who performed it. Until I have an opportunity however of examining the details of the case, I can offer no opinion of the proper method of performing such an operation, nor of the cases demanding it.

OF TYING THE AORTA.

To complete my account of aneurism, it is necessary to insert Mr. Cooper's case, which I regard as the most daring deed recorded in the annals of chirurgical history, but I must add, perfectly justifiable and highly honourable to a name already celebrated in all quarters of the globe.

"I fear that the title of this paper may impress the reader with an idea that nothing could justify me in performing the operation which I am about to describe ; for that a ligature made upon the aorta must necessarily prove fatal. But I trust, that it will be seen in the sequel, that the operation was not attended with the immediate danger which might have been apprehended ; that the patient complained of but little pain during its performance, that it afforded the only hope of safety, and that we had to lament, not that the operation was performed, but that it had not been sooner done.

"Sorry indeed should I be, to sport with the life of a fellow-creature who might repose a confidence either in my surgical knowledge or in my humanity ; and I should

be equally disposed to consider myself culpable, if I did not make every possible effort to save a person, whose death was rendered inevitable, if a disease were suffered to continue which it was possible for surgery to relieve, as in the case which forms the subject of this essay. In the performance of our duty one feeling should direct us; the case we should consider as our own, and we should ask ourselves, whether, placed under similar circumstances, we should choose to submit to the pain and danger we are about to inflict. Guided by this principle, and having collected all the evidence which applies to the case, we perform our duty without the reproaches of conscience which must await those who unnecessarily subject their patients to pain and danger.

“Those who feel disposed to condemn the attempt which I have here described, will have the kindness to recollect, that although my first operation for carotid aneurism proved equally unfortunate with this, yet in the second operation, I was gratified by the successful issue of the case.

“In collecting evidence upon any medical subject, there are but three sources from which we can hope to obtain it; *viz.* from observation on the living subject; from examination of the dead; and from experiments upon living animals. By the first, we learn the history of disease; by the second, its real nature, so far as it can be certainly known; and by experiments upon living animals, we ascertain the processes resorted to by nature for restoring parts which have sustained injuries, and then apply that knowledge to accidents in man.

“In applying ligatures upon the arteries generally, the only circumstance to be considered is, the probability of the blood being conveyed by means of anastomosis to the parts beyond; but in operations upon those arteries, which are seated in the larger cavities of the body, it

becomes a subject of consideration, by what mode the ligature shall be prevented from occasioning destruction. In common parts, it produces suppuration and ulceration, which end in the separation of the ligature; but amidst the vital organs, a suppurative process may endanger life.

“The Aorta is so rarely obstructed, that the opportunity of ascertaining the power of anastomosing vessels in propelling the blood is extremely unfrequent. The first impression arising on examination of the structure of the aorta at its curvature would be, that an anastomosis would not be sufficiently free to permit the blood to find its course by circuitous channels; and the only opportunity that I have had of seeing a contracted aorta in the human subject would serve to confirm that opinion: but Mr. Graham has met with a case (which will hereafter be detailed) which shews that even in that part of the aorta, the communication may be sufficient to allow a passage to the blood.

“With respect to the case of contracted aorta, which I had the opportunity of seeing, the following are the particulars, as given to me by Mr. Winstone, Surgeon, of Charter-house Square, who solicited me to inspect the dead body:—

““The gentleman, who formed the subject of it, was 57 years of age, of a full habit, accustomed to free living; had been in good health for years, excepting in the winter, when he was always troubled with a violent cough; more violent than I ever witnessed in any other person. In the night of April the 7th, 1809, he was affected with cough and difficulty of breathing to a greater degree than usual; and at five in the morning I saw him. He complained of pain under the sternum, the extremities were cold, the countenance exhibited marks of inexpressible anxiety; the pulse was rather weak, but regular, and much altered in frequency. These symptoms con-

tinued with but little alteration, notwithstanding cupping on the sternum, blistering and volatile medicines, until about eleven o'clock, when he was prevailed upon to go to bed. He walked up stairs, and fell on the bed lifeless.' ”

“ Upon our opening the body, the pericardium immediately presented itself, exceedingly distended ; and on making an incision into it, a large quantity of blood was discharged ; upon examination of the heart, one of the coronary veins was found ruptured on the anterior surface of the right ventricle. At first I supposed this was the source of the blood found in the pericardium ; but upon more minute examination of the heart, when I had brought it to my house, I found an opening leading into the right ventricle, and that the rupture had begun in this part of the heart and extended through its substance, bursting the vein in its progress. I opened the pulmonary artery, but found it free from disease ; the left side of the heart was also healthy, but the lungs adhered in some degree to the inner side of the chest, and a small quantity of fluid was found in each remaining portion of the cavity of the thorax. The finger being thrust into the aorta, opposite to that part at which the *canalis arteriosus* terminates, a stricture was discovered in it, which with difficulty admitted the little finger, and which, on more particular examination, was found to be a thickening of the circular fibrous structure of the vessel, accompanied with some ossification of its coats. This state of contraction in the aorta impeded the passage of the blood through the heart and lungs, and under the extreme degree of distention thus produced, the right ventricle, from its less power of resistance, gave way, and occasioned the sudden termination of the patient's existence.

“ The following case has been published in the *Medico-Chirurgical Transactions*, by Mr. Graham, Physician

to the Infirmary, Glasgow.—(Vide Medico-Chirurgical Transactions, Vol. V.)

“ ‘The case which I take the liberty of transmitting to the Medical and Chirurgical Society, has, as far as I know, but one parallel on record; and in it the appearances on dissection only are mentioned; no history is given of the case. I believe, I have extracted from the books of the infirmary, such parts of the reports taken at the patient’s bed-side as are of any importance, and have noted some anomalous symptoms which may now appear trifling; because it may perhaps be found that an improved state of knowledge may give importance to what at present seems adventitious, and without value. I am sorry to say, that as I can see no diagnostic symptom, the occurrence of this derangement adds but another chance to our guessing wrong during life, at the diseases of the heart.

“ Henry Frere, 14 years of age, a weaver, admitted into the infirmary the 3d of August, 1813, where the following history of his symptoms was entered on the journal of the house:—

“ ‘Two weeks ago, after exposure to cold, was affected with dry cough, which, for the last eight days has been attended with tolerably copious expectoration and pain, impeding respiration, and excited by the cough, in the left side of the chest; pulse 100, somewhat firm; little appetite; much thirst; tongue rather white; bowels regular; sleeps ill; sweats considerably; has used no medicines.’ ”

“ The disease was regarded as a case of pneumonia, but of such standing, that suppuration seemed to have taken place, and in which, therefore, no material benefit was likely to result from any treatment. However, under the ordinary means, bleeding, blistering, expectorants, and the free use of cathartics, I had the satisfaction of

seeing the symptoms decline. The blood from the first bleeding presented somewhat of the buff coat. The pulse, however, generally ranged from 92 to 104, and is variously marked in the reports; full, strong, sharp: it was always regular. The *sputum* became more copious, gross, and tinged with blood. He perspired chiefly from the upper parts of the body, moaned in his sleep, and took little food. On the 8th he was affected with nausea and vomiting. On the 19th he had a febrile attack, which lasted a few days. On the 20th there was much pain in the left eye-ball. On the 27th he complained only of palpitation—the first time that symptom is noticed in the journal, though I rather think this was an oversight. No report was taken from this date till the 6th of October, when he was dismissed from the hospital “cured.”

“The palpitation had subsided as the strength increased; which encouraged a hope I was willing to entertain, that this symptom proceeded from weakness, though I could not but express fears that the inflammation had extended to the pericardium or the heart. The uncertainty of the diagnosis in cases of this kind, is but too well known to every practitioner. I was inclined to suspect the effusion of serum within the pericardium, or perhaps adhesion of the heart to its capsule, though I had seen at least two cases about that time of the most intimate and general adhesion, without the circulation having been in any degree affected.

“These fears were much strengthened by the boy’s appearance on returning to the hospital on the 13th of November, when the throbbing of the carotid and subclavian arteries was very remarkable. On his re-admission, the following report appears on the journal:—

“‘13th November.—Dyspnœa, palpitation at the heart, and pain in the left side of the thorax returned soon after he left the house, and have been gradually increasing;

pulse 88, regular, bowels kept open by physic; received temporary relief from the application of a blister.' ”

“ Blisters and cathartics were again employed, and the symptoms for a time declined. The pain, which had been removed, returned to the left side of the chest on the evening of the 29th. A blister was repeated next day, which gave much pain, till he was suddenly seized with a febrile attack on the 2d of December, when the part became quite easy. There was no strangury. The fever was gone next day. A similar attack, accompanied with nausea and vomiting, was experienced on the 12th, and immediately removed by the operation of an emetic. He had acidity at the stomach, and cardialgia after meals. On the 23d, he is reported as having been affected for ten days with pain in the right side of the chest, increased by motion, and by full inspiration, accompanied by frequent cough, most troublesome in the night. The pulse had again risen; he was blistered, used cathartics, and was twice bled; the blood, especially after the first operation, being very buffy. The pulse subsided, and the pain was removed, but the cough and palpitation continued. The circulation was again quickened on the 27th, and remained hurried till his death; he sunk at length; was drenched in perspiration: took no food; was attacked with frequent vomiting; the urine became sandy; his sleep was disturbed; the dyspnœa and palpitations increased, and he expired about noon on the 2d of January. The pulse, while he was last in the hospital, fluctuated from 90 to 116, and was of various degrees of strength and firmness; latterly only, weak: it was always regular.

DISSECTION.

“ There was nearly a pound of serum in the cavity of the abdomen, and the bowels were distended with flatus,

but the viscera seemed natural. Immediately on turning up the sternum, the pericardium presented itself very much enlarged, obscuring the left lung, and adhering to the pleura costalis. This capsule, which was thin and beautifully transparent, contained about an ounce of fluid, and a heart nearly twice its natural size for a boy of this age. The arteries and trachea were distended above the arch of the aorta; the contents of the thorax were turned downwards; and the aorta, being divided below the whole, was removed from the body. The walls of the left ventricle were about an inch in thickness, but no other derangement in the structure of the heart or its valves, was observed. The capacity of the cavities seemed natural. The aorta expanded unusually near its origin, so as to form a kind of pouch, but after having given off the branches to the head and superior extremities, its diameter was preternaturally contracted. It was continued of this diminished size till after its union with the canalis arteriosus, where it was completely impervious. The coats were not thickened, or in any way diseased, except that about half an inch below the stricture, there was a smooth elevation on the inner surface, less raised, but having nearly the diameter of a split pea; otherwise the appearance was exactly such as if a ligature had been tied tightly round the artery. The obstruction was about a line in breadth. The artery then received three trunks about the size of crow quills, and near them three smaller ones, afterwards resuming its natural size along the vertebræ. These three trunks are evidently the uppermost of the inferior intercostals; their coats were remarkably thin, like those of veins. A probe passed from the pulmonary artery along the canalis arteriosus to the obstructed portion of the aorta; but from its thickened appearance, it did not seem probable much communication by means of it could have been allowed, and the florid countenance

of the boy during life establishes the same conclusion. There having been no suspicion of this singular deviation from the natural structure till after the contents of the thorax were removed from the body, it was impossible to trace, with the accuracy that could be wished, the anastomosing branches by which the circulation had been carried on in the inferior parts of the body ; but I think enough has been observed to lead us very near the truth. The *arteria innominata*, the left subclavian, the superior intercostals, and the mammary arteries, were much enlarged. The epigastric was reported to be of its natural size. These facts, and the aorta acquiring at least very nearly its natural size immediately below the stricture, shew that the blood did not pass to the inferior extremities, in any material quantity, as might perhaps have been expected, by the inosculations of the mammary and epigastric arteries, but chiefly by the communications of the superior intercostals and the mammary arteries with the three large branches entering the aorta below the stricture : also from the mammaries and thoracics through others of the intercostal and diaphragmatic arteries.

“The lungs were very light coloured ; the left lobe much collapsed. In each side of the thorax there was a small quantity of bloody serum.”

“After the aorta has formed its curvature, it gives off numerous intercostal arteries within the cavity of the chest ; and though these vessels are small, they communicate so freely with each other, that under a gradual obliteration of the aorta, the blood would be still readily transmitted to the inferior parts of the body. An example of this kind is related by Mr. Paris, and is quoted by Mr. John Bell, in his *Surgical Observations*.

“Mr. Paris, Dissector for the Amphitheatre of the Hotel-Dieu, in the year 1789, injected the body of a

very lean old woman, about 50 years of age, whose arterial system was found to be singularly deranged, and the circle of the blood changed altogether by a complete contraction of the aorta a little beyond the arch. Mr. Paris had his attention particularly excited to the condition of this subject by the unaccountable enlargement of the small arteries upon the fore part of the chest. He had filled the arteries with an injection composed of equal parts of suet and resin, coloured with lampblack; and this injection, thrown in from the mouth of the aorta, passed along so easily, that far from suspecting an obliteration, he felt that he could have thrown in more injection than is usually required for filling an adult body.

“The subject was so meagre, that, without dissecting, Mr. Paris felt the thoracic arteries running down the sides of the chest tortuous and remarkably enlarged. It was natural for him to be very careful in the dissection of this subject. He found the aorta immediately beyond its arch contracted to the size of a writing quill; the coats of the artery were of their usual thickness, and its cavity of course extremely small; the arch of the aorta above this contraction was but very slightly dilated; the part below had lost nothing of its natural size. Nothing could be found either in its own structure, or in the condition of the neighbouring parts, to account for this contraction of the artery.

“The carotids were in the natural state; the arteria innominata, and the left subclavian were enlarged to twice their natural diameter; all their smaller branches were increased in the same proportion, and had assumed a curled and zigzag course: the internal mammary and phrenic arteries were greatly enlarged and very tortuous. The transverse arteries of the neck were of twice their natural size; their posterior branches were tortuous, extending to a great distance over the back, with long inosculations which were met from below by the

branches of the upper intercostal arteries, and they were also remarkably enlarged; the thoracic and scapular arteries which run along the side of the chest, were twice their natural size.

“Below the constricted part of the aorta, the lower intercostals were remarkably enlarged, even to three or four times their natural size; each of them was dilated, but those were most affected which were given off nearest the contracted part; and the posterior branch of each, which penetrates to the muscles of the back, was more dilated than that which runs between the ribs: indeed, those posterior branches were so remarkably dilated with contortions so closely succeeding each other, that they resembled a necklace of beads; and their inosculations with the branches of the *transversalis cervicis* were very remarkable. The lower phrenic artery was enlarged, forming considerable inosculations with the superior phrenic; the epigastric artery was dilated to the size of the enlarged mammary, and was joined with it by very numerous and conspicuous inosculations!” This case clearly demonstrates, that the greater part of the blood, usually conveyed by means of the aorta through the thorax, is capable of finding a circuitous course by the branches of the subclavian and intercostal arteries.

“With respect to the aorta in the abdomen, I have met with no instance in the human subject of its obliteration or contraction; but if such an event were to occur, little difficulty could arise in the transmission of blood by collateral channels: the mammary and epigastric, the superior and inferior mesenterics, and the lumbar arteries would furnish abundant opportunity for a collateral course of the blood.

“Although in the human subject we are thus deficient in evidence concerning a circuitous circulation in the

cavity of the abdomen, yet with respect to other animals, it is probably generally known, that I have several times made ligatures upon the aorta of the dog, and found that the blood was readily carried by anastomosing vessels to the posterior extremities of the animal. Of which experiments an account has been published in the *Medico-Chirurgical Transactions*.

“The incision was, in each experiment, made on the left side of the spine, the aorta was drawn to the surface of the skin by an aneurismal needle, and all the surrounding parts being separated from the vessel, so as to perfectly bare its coats, a ligature was applied around it. An animal under these circumstances was kept for a few weeks, and then killed: being injected and dissected, the lumbar arteries, which were considerably enlarged, were found to be the chief agents of the new circulation. We have a beautiful preparation in the collection at St. Thomas’s Hospital, shewing the obliterated aorta, and the numerous and enlarged anastomosing vessels which carried on the circulation; thus establishing, as far as analogy could go, the possibility of the blood being transmitted in a similar manner in the human subject.

“I shall now proceed to detail the circumstances of the case, which forms the principal object of this Paper, leaving the remarks upon the kind of ligature to be employed till a description of the operation has been given.

CASE.

“Charles Hutson, a porter, aged 38 years, was admitted into Guy’s Hospital April 9, 1817, for a swelling in the left groin, situated partly above, and partly below Poupart’s ligament. An obscure pulsation could be perceived in it, and it was concluded to be an aneurism. The history which he gave of himself was, that thirteen

months previous to his admission, he had fallen against the corner of a chest, by which accident he received a violent blow upon the left groin, and was so much hurt as to be unable to walk to his home. On the following day, his thigh became so much discoloured and swollen, that he could not rise from his bed.

“After a confinement of three weeks, he began to recover, and the limb soon returning to its natural size, he resumed his employment, but was never able to exert that limb with the same freedom as the other : however, he continued to work, though with the greatest difficulty, till within a fortnight of his admission into the hospital : for some time previous to which, he had been occasionally troubled with a pricking sensation in the limb, but it was only transient, and seemed to arise from the pressure of the swelling upon the anterior crural nerve. Some degree of swelling had remained in the groin from the time of the accident ; and for some weeks previous to his admission, he had been obliged to loosen his clothes on the left side.

“At this period the swelling was considerably diffused, several large veins crossed its surface, and pressure upon it gave considerable pain. On the third day after he had been in the hospital, the swelling increased to double its former size, and the pulsation became less distinct, excepting in the course of the iliac and femoral arteries. The swelling extended from three to four inches above Poupart’s ligament, to an equal distance below it, and was of great magnitude. Just below the anterior and superior spinous process of the ilium, a distinct fluctuation could be perceived in the aneurismal sac above Poupart’s ligament, so that the blood had evidently not yet coagulated ; and the peritoneum was carried far from the lower part of the abdomen, in such a manner as to reach the common iliac artery, and to render an operation impracticable without opening the ca-

vity of the peritoneum. I therefore determined to avail myself of other means, or to wait the efforts of nature towards a spontaneous cure, before I performed any operation; a circumstance which it is well known every now and then occurs.

“*May 16.*—The swelling had suddenly increased; and the pulsation becoming more distinct, twelve ounces of blood were ordered to be taken from the arm.

“*21.*—Pressure was applied upon the fore part of the swelling, by means of a cushion bound down upon it by a broad roller; twelve ounces of blood being drawn from his arm, the patient declared himself to be more at ease.

“*27.*—The pressure upon the tumour being removed, the skin was found abraded and discoloured, with the loss of its sensibility.

“*30.*—In the morning he reported, that he had passed a restless night, and appeared to labour under considerable constitutional irritation. The swelling had very much increased; a tourniquet was ordered to be applied upon it, with directions to adjust it in such a manner as to press upon the aneurism, but upon the surrounding parts as little as possible.

“*June 1.*—He had borne the pressure of the tourniquet tolerably well, but it made no difference in the size of the tumour.

“*4.*—When the tourniquet was loosened, a slight ulceration of the skin over the sac was observed, and it was therefore ordered not to be re-applied.

“*5.*—He complained of the limb feeling so excessively heavy, that he had difficulty in raising it. The skin over the aneurism is shewing a disposition to slough.

“*19.*—A slough was observed on the exterior part of the swelling below Poupart’s ligament, which had nearly separated with a deep ulceration around it.

“*20.*—At ten in the morning he had a bleeding from

the external part of the sac, but the loss of blood was not considerable. A compress of lint was applied, and confined by adhesive plaster. He had no return of bleeding on the following day.

“22.—At 7 o'clock in the morning, after some slight exertion, he bled again; but still the bleeding was not profuse.

“24.—The bleeding again recurred, but stopped spontaneously.


“25.—About half-past two o'clock in the afternoon, in consequence of a sudden mental agitation, he bled profusely. My apprentice, Mr. Key, fortunately succeeded in preventing his immediate dissolution by pressure, but the man was so much exhausted, that the fæces were passed involuntarily.

“At 9 o'clock the same evening I saw him, and found him in so reduced a state, that he could not survive another hæmorrhage, with which he was every moment threatened. Yet, still anxious to avoid opening the abdomen, to secure the aorta near to its bifurcation, I determined to ascertain whether it were practicable to pass a ligature around the artery from within the aneurismal sac; for I was of opinion, that if the artery had given way near the centre of the sac, as it usually does in aneurism, I might compress it with my finger, and pass a thread around it. With this view, I made a small incision upon the aneurism, about two inches above Poupart's ligament; and having made a very small opening into the sac, I passed my finger easily into it, and felt for the artery upon which it was formed; in doing which, my finger so completely filled the opening, that it prevented the escape of any blood by its side. I moved the finger to feel for the artery, but found only a chaos of broken coagula, and that the artery entered the sac above and quitted it below, without there being any intervening portion of vessel; and therefore, was con-

strained to abandon that mode of operation. When I was about to withdraw my finger, I directed two of the students to compress with their hands the aorta upon the spine, and they succeeded in stopping the pulsation in the artery of the right groin. As I withdrew my finger, I put a dossil of lint by its side, and closed the opening which I had made into the sac.

“It is proper here to observe, that the aperture made into the aneurism by the sloughing process, was situated too far from the natural seat of the artery, to allow a hope of my finger reaching it from thence. As I was quitting the patient’s bed-side, I felt a great regret, in which all the students by whom I was surrounded joined me, that the patient should be left to perish, without giving him the only chance which remained of preventing his immediate dissolution from hæmorrhage, by tying the aorta; and I therefore said, “Gentlemen, this only hope of safety I am determined to give him.”

“*The operation* was performed as follows: The patient’s shoulders were slightly elevated by pillows, in order to relax, as much as possible, the abdominal muscles; for I expected that a protrusion of the intestines would produce embarrassment in the operation, and was greatly gratified to find that this was prevented by their empty state, in consequence of the involuntary evacuation of the fæces; and here let me remark that I should, in a similar operation, consider it absolutely necessary, previously to empty the bowels by active aperient medicines.

“I then made an incision three inches long into the linea alba, giving it a slight curve to avoid the umbilicus: one inch and a half was above, and the remainder below the navel, and the inclination of the incision was to the left side of the umbilicus in this form (). Having divided the linea alba, I made a small aperture into the peritoneum, and introduced my finger into the abdo-

men ; and then, with a probe-pointed bistoury, enlarged the opening into the peritoneum to nearly the same extent as that of the external wound. Neither the omentum nor intestines protruded ; and during the progress of the operation, only one small convolution projected beyond the wound.

“ Having made a sufficient opening to admit my finger into the abdomen, I then passed it between the intestines to the spine, and felt the aorta greatly enlarged, and beating with excessive force. By means of my finger nail, I scratched through the peritoneum on the left side of the aorta, and then gently moving my finger from side to side, gradually passed it between the aorta and spine, and again penetrated the peritoneum on the right side of the aorta.

“ I had now my finger under the artery, and by its side, I conveyed the blunt aneurismal needle armed with a single ligature behind it ; and my apprentice, Mr. Key, drew the ligature from the eye of the needle to the external wound ; after which the needle was immediately withdrawn.

“ The next circumstance, which required considerable care, was the exclusion of the intestine from the ligature, the ends of which were brought together at the wound, and the finger was carried down between them, so as to remove every portion of the intestine from between the threads : the ligature was then tied, and its ends were left hanging from the wound. The omentum was drawn behind the opening as far as the ligature would admit, so as to facilitate adhesion ; and the edges of the wound were brought together by means of a quilled suture and adhesive plaster.

“ During the time of the operation, the fæces passed off involuntarily, and the patient's pulse, both immediately, and for an hour after the operation, was 144 in a minute ; he was ordered thirty drops of tincture of opium

and camphorated mixture, and the involuntary discharge of fæces soon after ceased. I applied my hand to his right thigh immediately after the operation, and he said that I touched his foot; so that the sensibility of that leg was very imperfect.

“For the following particulars I am indebted to Mr. Cox, one of my apprentices.

“At midnight his pulse was 132.

“26.—At one o'clock in the morning, the patient complained of heat in the abdomen, but he felt no pain upon pressure; he said that his head felt hot, and that he had pain in the shoulders; his lower extremities, which were cold soon after the operation, were now regaining their heat; his body was in other parts covered with a cold sweat. The sensibility of the lower extremities has been very indistinct since the operation.

“At 2 o'clock, he felt so comfortable from his medicine that he wished to have more of it, and ten drops of tincture of opium were given him; his legs were wrapped in flannel, bottles of hot water were applied to the feet, and he then said that the heat of his belly was lessened.

“At 6 o'clock the sensibility of his limbs was still imperfect.

“At 8 o'clock A.M. he expressed himself as feeling quite comfortable; he however passed no urine, and had no evacuation; his right limb was warmer than the left, and the sensibility was returning.

“At noon the temperature of the right limb was 94, that of the left or aneurismal limb $87\frac{1}{2}$.

“At 1 o'clock P.M. Mr. Cooper visited him, and as he walked up the ward he appeared much gratified at seeing his patient, who was at the point of death the evening before, and who was now adjusting his bed-clothes, and smiled as Mr. C. approached his bed.

“At 3 o'clock after a fit of coughing, the man was

much alarmed with the idea of the thread having slipped into the wound : it was a false alarm ; but, to prevent the idea of its occurrence, it was fastened to a quill : soon after this he complained of pain in the abdomen ; it was not very severe, nor did it last long ; readily yielding to fomentations. As he had no evacuations, he was ordered an enema.

“ At 6 o'clock, P.M. he vomited, soon after the glyster had been administered : the heat of the right leg was 96, that of the left or diseased limb $87\frac{1}{2}$.

“ At nine in the evening he took half a glass of port wine in warm water, which he immediately rejected : he complained of pain in the loins ; his pulse was 104 and feeble ; he was very restless, and had an involuntary discharge of fæces.

“ Eleven at night, his pulse 100 and weak ; he still vomited.

“ 27.—At 7 A.M. the report was, that he had passed a restless night ; the vomiting had returned at intervals ; his pulse 104, weak and fluttering ; he complained of pain all over his body, more particularly in his head ; and the carotids beat with considerable force ; he had great anxiety expressed in the countenance, was very restless, and the urine dribbled from him, with some degree of pain at the end of the penis.

“ At 8 o'clock, A.M. the aneurismal limb appeared livid and felt cold, more particularly around the aneurism, but the right leg remained warm.

“ At 11 o'clock his pulse was 120 and weak ; he appeared to be sinking. To the questions which were put to him he did not return any answer ; he appeared to have an uneasiness about the heart as he kept his hand upon the left breast.

“ He died at 18 minutes after one, P.M. having survived the operation 40 hours.

“ After being informed of his death, I requested Mr.

Brookes of Blenheim Street to attend with me at the inspection of the body. Mr. Travers, surgeon of St. Thomas's Hospital, Mr. Stocker, apothecary of Guy's, and a large concourse of medical students attended the examination.

“When the abdomen was opened, we found not the least appearance of peritoneal inflammation, excepting at the edges of the wound. The omentum and intestines were free from any unnatural colour; the edges of the wound were glued together by adhesive inflammation, excepting at the part at which the ligature projected. We were much gratified to find that the ligature had not included any portion either of the omentum or intestine: the thread had been passed around the aorta about $\frac{3}{4}$ of an inch above its bifurcation, and about an inch or rather more below the part at which the duodenum crossed the artery. Upon carefully cutting open the aorta, a clot of more than an inch in extent was found to have sealed the vessel above the ligature; below the bifurcation, another, an inch in extent, occupied the right iliac artery, and the left was sealed by a third which extended as far as the aneurism; all were gratified to observe the artery so completely shut in 40 hours. The aneurismal sac, which was of a most enormous size, reached from the common iliac artery to below Poupart's ligament, and extended to the outer side of the thigh. The artery was deficient from the upper to the lower part of the sac, which was occupied by an immense quantity of coagulum.

“The neck of the thigh-bone had been broken within the capsular ligament, and had not been united.

“Upon consideration of all the circumstances of the case, to what are we to attribute this man's death? It did not arise from inflammation, for the viscera of the abdomen were perfectly free from it.

“ His death appears to me to have been owing to want of circulation in the aneurismal limb ; for although the warmth of the other limb was preserved, that on which the aneurism was seated never gained its natural heat, which must have arisen from the great bulk of the aneurism, and from the disturbed state of the coagulum which it contained, which would prevent the free course of the blood through the aneurismal sac. That limb never recovered its natural heat, there being seven degrees difference between the two extremities ; the sensibility also in the right limb was returning, which did not appear to be the case in the left. In an aneurism therefore similarly situated, the ligature must be applied before the swelling has acquired any very considerable magnitude.

“ There is still a circumstance, however, that remains to be decided respecting a ligature upon the aorta ; which is, in what manner it is to be afterwards separated : whether it should be left suspended at the wound, or cut off close to the vessel : whether the *presse-artere* of that ingenious surgeon Mr. Crampton should be employed ; or some unusual material should be used as a ligature. Although the patient whose case I have here given, did not suffer from inflammation of the abdomen, yet I should much fear that if he had lived longer, an extraneous substance suspended amidst the intestines would have produced that effect.

“ My friend Mr. Lawrence has proposed that the silk usually employed for ligatures should be cut off close to the knot, so as to heal the wound over it. It has occurred to me that catgut would answer the purpose better, and I shall give the result of the trial which I have made, wishing it to be understood that I consider the subject at present as undecided, and only as one for future investigation.

“ Catgut, employed as a ligature, being more of the

nature of the animal matter in which it is embedded, will be more easily absorbed than silk; or, if even not absorbed, will be less likely to excite irritation in the parts.

“I have reason to hope that the following case will be considered as highly interesting and important, as the operation was performed upon a person so advanced in life as to lessen the hope which would have arisen from the more usual operation for aneurism.

“I performed the operation at Guy’s Hospital, where the patient, who is the subject of it, at present remains; the notes of the case were taken by Mr. Hey, the son and grandson of the celebrated practitioners of that name at Leeds, who is now my pupil and clerk at Guy’s Hospital. From the assiduity he has discovered in his studies, and the acquirements made in his profession, there is every probability that he will confer additional brilliancy on a name which ranks amongst the highest in the present race of the medical profession.

CASE.

“*October 15th, 1817, William Heydon, aged 80, of a spare habit, but enjoying good health, has been for some years without any regular employment on account of his age, but accustomed to take more or less of walking exercise; his habits of life have been always regular. About three months ago he perceived a pulsating tumour situated very low down in the ham, and which at that time was about the size of a pullet’s egg; he could assign no cause for its appearance, and took but little notice of it. In a few weeks, however, it increased so much in size, and the pulsation became so strong, that he was induced to shew it to a surgeon, who, finding it to be an aneurism, recommended him to come into the hospital.*

“The tumour was now larger than an egg, compressible, the pulsation very strong and perceptible, and the skin of a natural colour. The pulse, though slow and not weak, intermitted : and the pulsation in the tumour exactly corresponded with it. He complained of a considerable pain in the leg at times, and when the pain was most violent the leg was very much swelled. The motion of the joint was somewhat impeded.

“24.—The usual incision for popliteal aneurism was made, and a single ligature was applied round the artery, both ends of which were cut off close, and the edges of the wound brought together by adhesive plaster ; the substance made use of for the ligature was catgut, which had been previously soaked in water, about the temperature of 100° . The coats of the artery were very much relaxed, so as to occasion some difficulty in passing the ligature round it.

“ $5\frac{1}{2}$ P.M. About four hours after the operation, complained of a sense of coldness and uneasiness in the limb which had been operated on ; its temperature was 80° , and that of the sound limb 84° . The pulse which beat 76 times in the minute was full and very irregular, but did not intermit.

“25.—Has not passed a very good night, but feels comfortable this morning. Temperature of the limb that has been operated on 84° , that of the sound limb 92° ; pulse 60, and intermits ; but very rarely.

“26.—Has had a good night, and feels more comfortable, though he still complains of violent pain in his leg at times ; temperature of the affected limb 89° , that of the sound limb 92° ; pulse intermits once in every 10 or 12 beats.

“27.—Much in the same state as yesterday ; temperature of the affected limb 89° , sound limb 87° .

“28.—The wound was dressed for the first time since the operation, and was found to be *completely*

united ; the pulse varies very much in its intermissions, but upon the whole they have been much less frequent since than before the operation.

“29.—Temperature of the affected limb 89° , sound limb 87° .

“30.—Temperature of the affected limb 89° , sound limb 93° ; the tumour in the ham is considerably lessened and has no pulsation ; nor is any pulsation to be yet felt in the anterior or posterior tibial artery, though a free circulation appears to be carried on in the superficial veins.

“31.—Temperature of the affected limb 90° , sound limb 91° .

“*November 1.*—Temperature of the affected limb 91° , sound limb 91° .

“7.—Nothing material has occurred since the last report ; there has been very little variation in the temperature of the limb, or in the state of the aneurismal tumour, which continues gradually to subside. The wound remains perfectly united and free from irritation.

“15.—The tumour continues to diminish in size and is much softer ; no pulsation can yet be felt in the anterior or posterior tibial artery : his health is very good, and he can walk about the ward with the assistance of a crutch.

“24.—Continues to improve, no appearance of irritation from the ligatures ; no pulsation in the anterior or posterior tibial artery.

“In three weeks after the operation he walked in the ward with the aid of a crutch, and in the first week, he had no other complaint than coldness in the foot on that side, with some pain in the heel.

“*December 17.*—His health is perfectly good ; he walks without the aid of crutch or stick ; the swelling

is reduced to a small size; and the part at which the incision was made has been and now is quite free from irritation.

“I confess that this case gave me much pleasure; the great age of the patient, the simplicity of the operation, the absence of constitutional irritation and consequently of danger, and his rapid recovery, lead me to hope that the operation for aneurism may become at some future period, infinitely more simple than it has been rendered to the present moment.”

CHAPTER XXVIII.

Of False Aneurisms.

SPURIOUS or false aneurisms are always occasioned by a wound or rupture of an artery, in consequence of which blood escapes out of the cavity of the artery and forms an aneurismal sac in the surrounding parts. The term *diffused false aneurism* is applied to those cases where the blood forms an irregular swelling extending in different directions from the seat of the injury, and the aneurism is called *circumscribed*, when a regular, circumscribed tumour is formed. These terms are applied also in some cases to true aneurisms without any propriety, since the extent of diseased vessel does not occasion any change in its nature.

A species of false aneurism called *varicose* was first described by Dr. William Hunter.* In this disease the coats of an artery are punctured by an instrument which had previously passed through a neighbouring vein, and by this means corresponding apertures are formed whereby the blood flows out of the artery into the vein. The accident generally happens in the common operation of *venesection*.

Dr. Hunter's account of this affection is very accurate. "In the operation of bleeding, the lancet is plunged into the artery through both sides of the vein, and there will be three wounds made in these vessels, viz. two in the vein and one in the artery, and these will be nearly opposite to one another, and to the wound in the skin. This is what all surgeons know has happened in bleed-

* Scarpa says by Guattani.

ing, and the injury done the artery is commonly known by the jerking impetuosity of the stream, whilst it flows from the vein, and by the difficulty of stopping it, when a sufficient quantity is drawn.

“In the next place we must suppose, that the wound of the skin, and of the adjacent, or upper side of the vein, heal up as usual ; but, that the wound of the artery, and of the adjacent, or under side of the vein, remain open (as the wound of the artery does in the spurious aneurism) and, by that means, the blood is thrown from the trunk of the artery, directly into the trunk of the vein. Extraordinary as this supposition may appear, in reality it differs from the common spurious aneurism in one circumstance only, viz. the wound remaining open in the side of the vein, as well as in the side of the artery. But this one circumstance will occasion a great deal of difference in the symptoms, in the tendency of the complaint, and in the proper method of treating it: upon which account the knowledge of such a case will be of importance in surgery.

“It will differ in its symptoms from the common spurious aneurism principally thus. The vein will be dilated, or become varicose, and it will have a pulsating jarring motion on account of the stream from the artery. It will make a hissing noise, which will be found to correspond with the pulse for the same reason. The blood of the tumour will be altogether, or almost entirely fluid, because kept in constant motion. The artery, I apprehend, will become larger in the arm, and smaller at the wrist, than it was in the natural state ; which will be found out by comparing the size, and the pulse of the artery in both arms, at these different places ; the reason of which I shall speak of hereafter. And the effects of ligatures, and of pressure upon the vessels above the elbow and below it, will be what every person may rea-

dily conceive, who understands any thing of arteries and veins in the living body.

“The natural tendency of such a complaint will be very different from that of the spurious aneurism. The one is growing worse every hour, because of the resistance to the arterial blood, and if not remedied by surgery must at last burst, the other in a short time comes to a nearly permanent state ; and, if not disturbed, produces no mischief, because there is no considerable resistance to the blood, that is forced out of the artery.

“The proper treatment must, therefore be very different in these two cases, the spurious aneurism requiring chirurgical assistance, as much, perhaps, as any disease whatever ; whereas, in the other case, I presume it will be best to do nothing.

“If such cases do happen, they will no doubt be found to differ among themselves, in many little circumstances, and particularly in the shape, &c. of the tumefied parts. Thus the dilatation of the veins may be in one only, or in several, and may extend lower or higher in one case, than in another, &c. according to the manner of branching, and to the state of the valves in different arms. And the dilatation of the veins may also vary, on account of the size of the artery that is wounded, and of the size of the orifice in the artery and in the vein.

“Another difference in such cases will arise from the different manner, in which the orifice of the artery may be united or continued with the orifice of the vein. In one case, the trunk of the vein may keep close to the trunk of the artery, and the very thin stratum of cellular membrane between them, may by means of a little inflammation and coagulation of the blood among its filaments, as it were, solder the two orifices of these vessels together, so that there shall be nothing like a canal going from one to the other ; and then the whole tumefaction will be more regular, and more evidently a dilatation of

the veins only. In other instances the blood that rushes from the wounded artery, meeting with some difficulty of admission and passage through the vein, *may dilate the cellular membrane, between the artery and vein, into a bag, as in a common spurious aneurism, and so make a sort of canal between these two vessels.* The trunk of the vein will then be removed to some distance from the trunk of the artery, and the bag will be situated chiefly upon the under side of the vein. The bag may take an irregular form, from the cellular membrane being more loose and yielding, at one place, than at another, and from being unequally bound down by the fascia of the biceps muscle. And if the bag be very large, especially if it be of an irregular figure, no doubt, coagulations of blood may be formed, as in the common spurious aneurism."

With respect to the treatment of FALSE ANEURISM, no reliance is to be placed upon any remedy except the ligature; a free incision is to be made into the cavity of the aneurism, that the bleeding orifice may be seen or felt: a ligature is then to be applied above and another below it, and firmly tied. One of the most serious cases of this kind is a case of aneurism recorded by Mr. John Bell. The injury was occasioned by a fall on a pair of scissors which penetrated the hip opposite the sciatic notch; an aneurismal tumour formed, an incision was made into it, and a large quantity of coagulated blood was suddenly discharged. The opening was enlarged and the clots evacuated. A torrent of fresh arterial blood now jetted forth, and "in a moment twenty hands were about the tumour and the bag was filled with sponges and cloths of all kinds." At this instant a bistoury was run upwards and downwards, and an incision *two feet in length* was made, at which time the patient was apparently lifeless. Mr. Bell now disco-

vered with his finger the gush of warm blood, and distinctly felt the pulsation of the vessel, which convinced him that the man was still alive. The artery was easily secured ; it was the *posterior iliac artery* which had been cut fairly across, and bled with open mouth ; it was cut and tied exactly where it turns over the bone. The patient ultimately recovered.

In all such cases it is of primary importance to act with promptness and decision ; delay in such cases is not merely dangerous but fatal. In all operations, therefore, for the cure of false aneurism, if practicable, the loss of blood should be restrained by a tourniquet, or pressure, on the artery supplying the tumour, whilst the operation is performed, and in such cases the surgeon may act deliberately ; but where cases occur similar to that described by the dauntless surgeon last quoted, a bold and sudden exertion is absolutely indispensable. Mr. Bell's rules of practice on this subject are so very important that I shall quote them from Dr. Smith's valuable abridgement of his principles of surgery, and I know no part of Mr. Bell's writings more honourable to the author than his remarks on the present subject.

“ In great aneurisms, then, of the arm or thigh, when the tourniquet can be applied, do your operation deliberately, steadily, slowly, but do not needlessly prolong your patient's suffering. Cut the skin nicely, open the sac freely, dissect your artery very clean, and tie it clear of the nerve, and pass your ligature with a blunt needle or crooked probe ; for whenever you are reduced to the necessity of using the sharp needles your patient is in danger. Tie your artery with moderate firmness ; tie it in two places (for on several occasions the retrograde blood has flowed out even in the time of the operation ;) clean the sac ; look now attentively to your two ligatures, and if you see the upper one moving according to the pulsation of the artery, all is right. Finally, if you

approve of my reasoning, cut the artery across in the middle betwixt the ligatures. When the tourniquet cannot be applied, do not trust to compression. Your assistant may try to compress the artery, but do not lay your account with performing a cool deliberate operation ; expect rather a dash of blood at the first stroke you make into the sac, and confusion and alarm of every kind. Compose your mind for such a scene ; bend up each corporeal agent to this attempt ; expect safety for your patient from nothing but your own daring operation ; be resolute, bold, and rapid ; but let this boldness be the result of serious deliberation, and earnest consultation with your friends. And in what does this rapidity consist ? Is it a dangerous stroke that you are to make ? No surely : the rapid movement is merely slitting up suddenly the half putrid and tendinous sac, and turning out the clots of blood with your fingers, while the artery, nerve, and all the important parts lie safe at the bottom of the tumour. You are to trust much to your acquaintance with the parts, therefore make sure of your knowledge of the artery that is actually wounded ; return to your books, drawings, and preparations ; hold consultations with your friends ; lose no opportunity of making up your mind beforehand ; the more you reason upon the case, and revolve the possible dangers, the greater will be your prospect of sustaining yourself with becoming resolution in the moment of operation."

Dr. Smith very judiciously adds to these directions that "there is no necessity for opening the aneurismal sac in those cases in which you can tie the vessel above where it has been wounded, unless the sac is very large ; operate, in short, as in spontaneous aneurism."

The treatment of VARICOSE ANEURISM depends upon the nature of the case. In a great majority of instances the aneurismal sac is formed by the vein dilated into a pouch

over the artery. These cases sometimes occasion very little trouble to persons who do not use the arm violently. Scarpa recommends in such cases to order the patient to abstain from using the arm, and to keep it as little as possible hanging by the side. Perhaps moderate compression, absolute rest, and a low diet, would tend greatly to prevent mischief after the puncture of an artery, and in the forming state of varicose aneurism. In some instances a spontaneous cure takes place, and in others the disease remains without occasioning any great inconvenience. A whizzing noise can be heard by applying the ear to the part, and any thing which excites the circulation occasions a distressing throbbing, but no tumour forms, and the patient prefers the existing evil to an operation. Mr. Pott, Dr. Hunter, and several other surgeons have met with such cases, and a lady of Philadelphia is at present situated in this manner. She has a varicose aneurism which was occasioned by venesection many years ago, and it remains at present without occasioning any inconvenience sufficient to induce her to submit to an operation.

In some few cases, however, a very different result takes place, and the vein becomes distended, producing all the dangers and most of the symptoms of other aneurismal swellings. In such instances the tumour must be cut open and treated as a common false aneurism, the aperture in the artery being secured by a ligature above and another below the orifice. To obviate all inconvenience it is surely best as soon as an artery is known to have been opened in the operation of venesection to cut down to and tie it up.

Dr. Hunter in his accurate description of varicose aneurism, or as it is now called ANEURISMAL VARIX anticipated the probable occurrence of a case which he never saw, but which has since occurred to Mr. Park of Liverpool, and to Dr. Physick. I have marked in italics

the words in which he hints at this case,* and I now proceed to detail such a one ; it was published by Dr. Physick in the first volume of the Medical Museum together with the mode of treatment.

“ A young gentleman from Virginia applied to me last April to undertake the treatment of an aneurism, situated at the bend of the elbow, occasioned by his having been bled in the basilic vein in October, 1801. He informed me that the bleeder at the time of the operation experienced no difficulty in stopping the blood, but that a very considerable ecchymosis formed, occasioning a livid colour of the skin about the wound and extending both above and below the elbow. The ecchymosis disappeared after a few days, but a pulsating tumour was observed directly under that part of the vein which had been punctured. This tumour gradually increased in size for six months, but afterwards the increase of the tumour, if any, was so slow as not to be observed, though the basilic vein running over it began to enlarge.

“ On examining the arm I found a tumour at the bend of the elbow pulsating very strongly ; exactly resembling a true aneurism : there was also two tumours, one situated above, and the other immediately below this aneurismal sac, in which the particular thrill always met with in varicose aneurisms was very distinctly felt. These tumours were evidently distensions of the basilic vein, the trunk of which however for about three-fourths of an inch, where it passed over the aneurismal sac, was very little enlarged : by making pressure on the middle of this last mentioned portion of the vein, the orifice of communication between the aneurismal sac and the vein could be felt ; and by applying the finger accurately over it, the flow of blood into the vein could be prevented, and the thrill, while the pressure was continued, ceased.

“ The case was now easily understood : the artery had

* See page 254.

no doubt been punctured by the lancet, pushed into it through the vein by the bleeder; the pulsating tumour was a sac formed in the cellular membrane between the artery and vein, by the impulse of the arterial blood: the enlargement of this sac went on until its sides became firm and resisting, and then the blood from the sac was thrown with such force into the vein through the puncture in its lower side, as to cause it to distend very considerably, for two or three inches above and below the sac; the intermediate portion of the vein however running over the sac being supported by it, was very little enlarged.

“As the upper portion of the vein was observed to distend very rapidly, the skin covering it being very thin and every where marked with cicatrices; the patient apprehending a sudden rupture of the tumour, became very uneasy in his mind: the fore-arm was much diminished in size, and the hand was constantly cold. These circumstances together with the existence of the aneurismal sac, determined Dr. Wistar and myself to advise the operation of tying the artery above and below the sac.

“I performed the operation in April, 1801; within a quarter of an hour after, the pulse of the artery at the wrist was distinctly perceived; in three weeks the wound was cicatrized, and the patient very soon recovered the most perfect use of his hand and arm. It seems unnecessary to describe the operation further than to mention, that after dividing the skin and cellular membrane covering the swelling by a straight incision, I dissected round the tumours, then tied the trunk of the vein above and below its enlargement, next tied the artery above and below the sac; the parts comprehended between the ligatures were then cut out, which has enabled me to have the annexed drawing of them made. They are represented of their natural size.

EXPLANATION OF THE PLATE.

Fig. 1. AA. The basilic vein distended above and below the puncture.

B. The cicatrix from bleeding.

D. The aneurismal sac.

CC. The brachial artery.

Fig. 2. AA. The enlarged vein.

e. Orifice of communication between the vein and aneurismal sac.

D. The inside of the aneurismal sac every where incrustated with bone.

E. The orifice of communication between the artery and the aneurismal sac.

CC. The brachial artery.

F. Dotted lines representing the situation of the artery under the sac. The artery was not enlarged nor in any respect diseased.

Fig 1

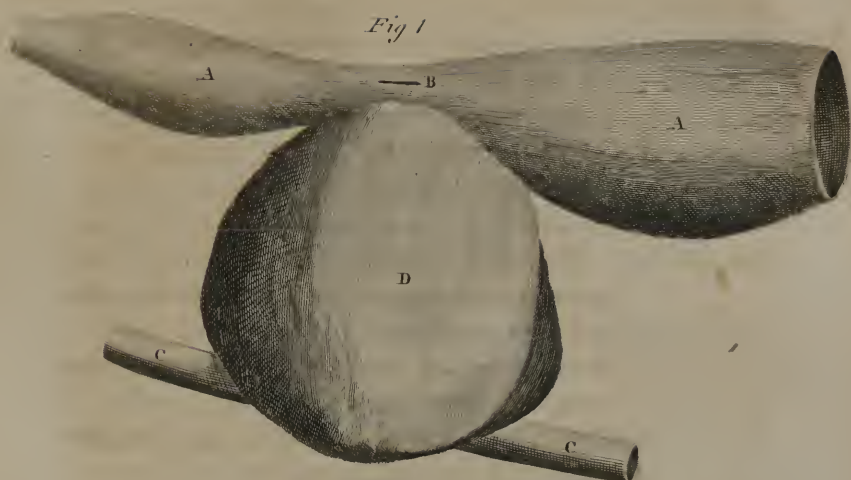
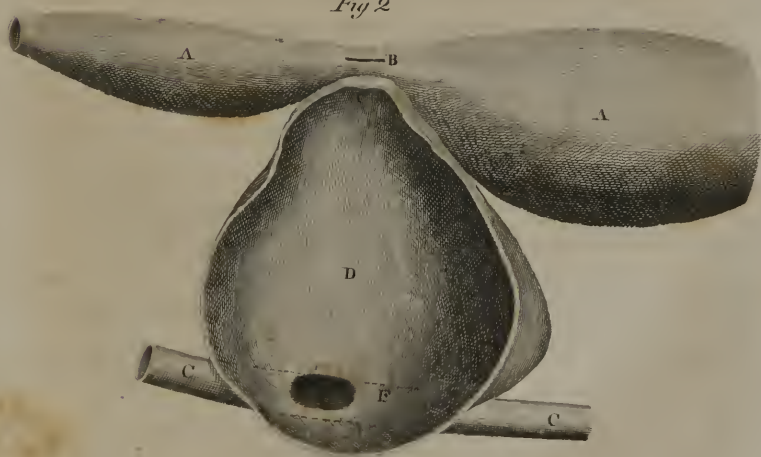


Fig 2



I have lately seen a case of aneurismal varix attended with some very extraordinary circumstances. The patient had received many years before a load of buckshot in his leg. When the parts healed a varicose aneurism was discovered just below the knee, and in a short time the superficial veins of the leg were all enlarged, and the thrill peculiar to this species of aneurism could be distinctly felt. When I saw the patient, twelve years had elapsed after the occurrence of the accident, and the veins of the leg from the toes to the groin were all greatly distended. The leg was constantly very painful, and ulcers formed on the foot and ankle which resisted every remedy.

The patient was attended by Dr. Physick and Dr. Wistar. The enormous distention of the vessels of the leg, and the uncertainty of finding the communication between the artery and vein induced them to tie up the femoral artery in the middle of the thigh. The patient's leg mortified as high up as the middle, and whilst the dead parts were separating a sudden and unexpected hemorrhage took place from one of the enlarged veins in the mortified part near the ankle, which greatly reduced his strength, and although the bleeding was for a time arrested by tying up the vein from which it issued, yet it recurred, unnoticed by the nurse, and he became gradually weaker and finally expired; I dissected the limb and found the whole trunk of the femoral artery as high as the groin in an enlarged and unnatural state—the veins of the limb were all greatly distended, and a bougie readily passed along the popliteal artery into the posterior tibial artery, which was enlarged, and out of this into venous pouch situated at the inner part of the leg below the knee.

Before concluding the subject of aneurism I shall briefly notice a species of tumour consisting chiefly of en-

larged blood-vessels, which has been called by Mr. John Bell, ANEURISM FROM ANASTOMOSIS.

This complaint exists in some cases of *nævi materni* in children, and is congenital. Many cases however occur in which a gradual enlargement of vessels takes place, originating in a pimple or spot, and sometimes appears to result from accidental injury. It is attended with constant throbbing, and great turgescence of the vessels, augmented and diminished in proportion to the rapidity of the general circulation. When the part happens to be scratched hemorrhage takes place very freely from it, and sometimes the vessels burst without any accidental injury and pour forth very considerable quantities of blood.

There is but one remedy for this complaint; the total excision of the diseased parts. It is very important to cut completely outside of the tumour; if the surgeon inadvertently cut into it, the bleeding will be profuse. The arteries which nourish the tumour are easily taken up, if the external incision is made at a small distance from its margin. This is one of those cases in which it is important to remove the parts quickly, as the hemorrhage continues, and is sometimes very profuse during the operation.

A very common situation for these tumours is the scalp, and no difficulty attends their extirpation. An incision should be made quickly round the swelling down to the bone, and then the diseased portion of scalp is easily detached, and the arteries which supplied it can be secured.

Mr. Pelletan relates a case somewhat analogous to this disease, in which all the branches of the temporal artery were morbidly dilated, and I have very recently seen a case of aneurismal tumour in which the whole scalp was pervaded by very large arteries. The princi-

pal diseased spot, however, appeared to be formed of a convolution of the branches of the occipital artery. In this case the larger arteries leading to the tumour, some of which were equal in diameter to the brachial, were successively tied up before any operation was attempted on the tumour, and very fortunately, for notwithstanding this precaution, when the circular incision was made round the tumour, so large a quantity of blood was lost that great alarm was occasioned.

To prevent the deformity attending the separation of large portions of scalp, Dr. Physick has in some cases cut round the tumour, tied up the blood-vessels, and suffered the parts to remain ; lint being interposed between the edges of the wound to prevent immediate union. The tumour after such an operation is in great measure absorbed and much diminished in size.

A very excellent account of these vascular tumours may be found in John Bell's Principles of Surgery.

CHAPTER XXIX.

Of Mammary Abscess.

THE breasts of women are sometimes the seat of very painful and distressing abscesses. They are sometimes seated deeply in the glandular substance of the breast, and at other times in the investing cellular membrane. The inflammation commences in the usual manner, and the pain, hardness, and swelling, are in general very considerable.

When the glandular structure is affected the secretion of milk is much diminished, and is sometimes totally suspended. The disease in its progress is attended with severe pains shooting up into the axilla, and the axillary glands often swell and inflame.

The progress of this complaint varies; sometimes it is rapid and suppuration takes place in three or four days, and in other cases it is much slower. Sometimes an oedematous swelling forms, and the nipple appears buried below the level of the skin. In some cases several distinct hard tumours are found in the breast; and when these suppurate an equal number of separate abscesses are formed. It now and then happens that one abscess opens by several small apertures, and sinuses are thus made, communicating with each other under the skin.

Mammary abscesses form at different periods after delivery, and are always attended with more or less fever preceded in general by a chilly fit. They result sometimes from exposure to cold—from tight dresses—accidental injuries—long retention of milk—and from the

usual causes of inflammation ; and in other instances no evident cause can be assigned.

The remedies for this complaint differ in nothing from the common remedies for inflammation. Blood-letting according to the strength of the patient, purges, and low diet are to be first employed. After general bleeding the application of leeches is extremely serviceable. The best local remedy is a soft bread and milk poultice with lead water. After the use of the preceding remedies, if the inflammation continue, a blister should be applied over the inflamed part.

When suppuration is established if the abscess should not speedily open, a puncture may be made with a lancet, and the matter evacuated ; free incisions have been recommended in these cases, but during the existence of acute inflammation they are unnecessary, and the puncture can in general be kept from healing by a soft poultice, or by a piece of linen rag placed in the orifice.

When sinuses form they are to be laid open freely. When an œdematous swelling takes place the application of spiritus mindereri, and repeated purges generally carry it off. The indurations which sometimes follow mammary abscess have been already noticed in the chapter on cancer ; they yield in general to purges, blisters, mercury, and cicuta.

CHAPTER XXX.

Abscess of the Hip Joint.

THIS is a well known disease met with in patients of every age, but more commonly in children than in adults. In its commencement it is very insidious, and sometimes is not preceded by any pain; a slight weakness, and some degree of limping generally attend; a loss of appetite, and disinclination to motion are observed. A pain in the knee is a common symptom; and this pain sometimes misleads patients and their medical attendants, who imagine the mischief to be seated in the knee, and have no suspicion of the hip.

In general before the disease has made much progress, pain is perceived in the vicinity of the affected joint, and the limb appears longer than the sound one—a circumstance easily accounted for from the crookedness of the pelvis, the patient supporting the weight of the body entirely upon the sound side, the limb becomes diminished and emaciated. Pain is experienced in examining the limb, from pressure upon the parts concerned in forming the joint which are in a state of inflammation. The nates become flattened—the whole form and appearance of the hip is changed, and the natural convexity of the buttock is lost. The knee may be moved without pain, but every motion of the hip occasions a very severe pain. When the patient attempts to walk, the thigh is bent forwards, the knee is flexed, and the weight of the body is almost entirely sustained by the sound limb; great pain is sometimes experienced in attempts to

straighten the affected limb. The preceding symptoms characterize the early stage of the complaint.

When pus is about to form, the pain is augmented and becomes constant; the soft parts around the joint become sore and tender; a degree of tension is perceived; the skin is hot and red, and considerable fever comes on, sometimes attended with fits of shivering. Shortly after these symptoms the pain abates, and a swelling is perceived containing pus.

In some instances, however, the inflammation assumes a more chronic form, and no particular increase of pain precedes the formation of pus.

It sometimes happens that after the affected limb has been longer than the sound one, it suddenly becomes shorter; this is owing to what has been called a *spontaneous dislocation of the os femoris*; the head of the bone is actually protruded from the acetabulum by the inflammatory swelling of the contents of that cavity. It is said that this dislocation sometimes precedes the formation of pus. The joint then gets well without an abscess, and the parts heal by ankylosis; but this is rare.

Hectic fever generally attends the disease of the hip joint. Pus of a thin sanious consistence is continually discharged from one or more orifices. Abscesses form in various parts of the thigh, and the strength of the patient is much exhausted. Carious bone can generally be felt by a probe passed into any of the sinuses.

The acetabulum is diseased as well as the os femoris: the cartilages detached by absorption, and the solid bone is also greatly diminished by the same process. In some cases this separation of the cartilages gives rise to an ankylosis between the os femoris and acetabulum, and a cure is effected; but more commonly the disease progresses—every motion is attended with extreme pain; the patient lingers months and even years, and ultimately expires.

I have known the bottom of the acetabulum absorbed in a case of hip disease and the head of the os femoris pushed through into the pelvis.

TREATMENT.

The remedies to be successful must be active in the early stage of the complaint—but it unfortunately happens that we are seldom sent for until the disease has made great progress; bleeding, purging, emetics, sea bathing, the various remedies for scrofula, mercury and many others have been used in this disease without effect—Issues which are highly recommended, do but little service—Dr. Physick has seen a great number of these cases, and has found those succeed best which were treated by very active and long continued purging. The best cathartic is Jallap and Cream of Tartar every day, or every two days—the health and strength of the patient under this mode of treatment greatly improves, and in several instances a complete cure has been effected. In addition to this, however, a vegetable diet, and absolute rest are to be enjoined. In children it is difficult to carry this last prescription into effect, and it is found extremely convenient to have a curved splint to fit the hip and thigh.

After suppuration comes on, little can be done, but to keep open the sinuses till the dead bone comes out. The constitution must be supported by bark, wine, and nourishing diet—and inflammatory fever when it occurs, must be combatted by bleeding, and a low diet—Leeches and blisters are certainly useful in the early stage of the disease.

The appearances of a diseased hip joint on dissection vary according to the period of the disease at which it is made. Mr. Ford gives an account of two dissections, one in an early and the other in a later stage of the com-

plaint. In the first the head of the os femoris was inflamed; the capsular ligaments were somewhat thickened, the round ligament retained its usual connection both to the head of the thigh bone, and to the acetabulum; about a teaspoonful of pus was contained in the cavity of the joint, and the cartilage lining the acetabulum was *eroded* (absorbed) in one place with a small aperture through which a probe might be passed underneath the cartilage into the internal surface of the os pubis on one side, and on the other into the os ischii, the opposite or external part of the os innominatum shewing more appearance of disease than the acetabulum. In the second case the disease was more advanced, and exhibited the usual appearances of a destruction of parts in consequence of suppuration.

The best writers on this subject are Desault, Boyer, Cooper, Crowther, and Ford.

A disease somewhat analogous to that of the hip joint occurs in the knee, and forms one species of white swelling; for a very excellent history of that subject, and many other affections of the joints, I refer to Mr. Samuel Cooper's valuable treatise on the diseases of the joints.

CHAPTER XXXI.

Lumbar or Psoas Abscess.

OF the various abscesses which fall under the notice of the surgeon, there is not one more extensive or serious than that which occurs in the loins, and which is therefore denominated lumbar abscess. The matter collected in these cases is seated in the cellular texture surrounding the psoæ muscles, and hence the disease is frequently called psoas abscess. These collections of matter are situated posteriorly to the peritoneum, and occasion swellings in various situations. The disease originates in many cases in bruises or hurts, but in a variety of instances no evident exciting cause precedes it, and it is ascribed to bruises in bed, slight sprains, or heavy lifts, &c.

The symptoms often commence with a difficulty in walking, with some sense of weakness or uneasiness in the loins, but without any acute pain. Indeed we sometimes find very copious collections of pus in these cases without any pain having preceded.

The matter formed increases gradually in quantity, and makes its appearance by a tumour in the upper part of the thigh, or just under Poupart's ligament; sometimes it descends lower and points at the middle of the thigh, travelling under the tendinous fascia femoris; sometimes in the loins, and sometimes on the back. It occasionally descends into the pelvis and points near the anus, resembling a fistula in ano. I once saw a case in which a gallon of pus was discharged from a psoas abscess which opened within an inch of the anus—my

patient very speedily and happily recovered his general health, though a fistula in ano was the consequence, and this was cured by an operation.

Psoas abscess is often connected with a curious state of the vertebræ; sometimes this caries is a cause and at other times an effect of the abscess. Where this is the case the patient is generally unable to stand erect, and to exert the muscles of the loins, and paralysis of the lower limbs comes on.

Where the tumour appears in the groin it has been mistaken for hernia; the tumour subsiding when the patient is in a recumbent posture and returning again when he rises erect. The fluctuation being evident, removes any doubt of this kind.

TREATMENT.

When we are called early in the disease the usual remedies for inflammation must be used; bleeding, purging, and low diet, leeches to the loins, or cupping, are also useful—Rest and a horizontal posture must be enjoined—Blisters over the lower part of the back are highly serviceable—Issues with caustic are to be resorted to if the previous remedies fail.

After matter has formed and presented itself by an external tumour, it becomes an object of very considerable moment to ascertain whether the abscess should be opened. We need not apprehend any danger of its opening into the cavity of the abdomen, as there are no such instances recorded, although fatal hemorrhage has in some cases resulted from absorption of the great blood vessels in the vicinity of the abscess.

The danger of opening the abscess depends upon the violent fever which invariably follows a wound of any large cavity, unless the opening be healed immediately and the cavity be again rendered perfect. Mr. Hunter first taught

that the imperfection merely of a large cavity without its exposure to the air, would cause extensive inflammation through its sides, and violent constitutional effects. Mr. Abernethy to avoid the evils of an imperfect cavity, proposed to make a puncture through the parietes of the abscess in such a manner that the sides of the wound might heal by the first intention. This is effected by making a valvular opening with a sharp lancet, by passing the lancet first through the skin, and then obliquely upwards under the skin, for half an inch or more, then the point of the lancet is to be depressed and pushed into the cavity of the abscess. The matter now flows freely through the wound; if the patient's strength permit, and the abscess be not very large, the whole contents may be at once removed; but in cases where large quantities of pus are collected this is dangerous; we therefore remove a pint or more, and complete the evacuation a few hours after—the sides of the puncture are now to be brought into contact, and kept so by adhesive plaster—they unite readily. In performing this operation great care is necessary, if the abscess point in the groin, to avoid the large vessels—probes or canulas are never to be introduced. After the operation the matter collects in a few weeks, and is to be again opened in the same manner. This operation repeated several times has the effect of gradually contracting the dimensions of the cavity, and when this is considerably diminished a larger opening may be made without danger. In some cases, however, the puncture does not heal by the first intention, and then extensive inflammation supervenes, and often terminates fatally.

The disease we are now considering is frequently attended with caries of the vertebræ (of which we shall speak more particularly in the next chapter.) In that case it becomes doubtful whether an opening ought to be made into the abscess for the evacuation of the pus.

because so long as carious bone exists in the spine, so long will suppuration continue, and consequently no reasonable hope of a cure can be entertained. If it be distinctly ascertained that carious bone does exist, then I believe it will be best not to make a puncture into the cavity of the abscess, except there be danger of an opening by ulceration, in which case the puncture should at all events be made, because a very small aperture will be thereby substituted for a larger one, and much of the danger from inflammation in the cavity of the abscess will be prevented. The puncture should be healed as speedily as possible. The mode of treatment when carious vertebræ are discovered will be detailed presently. It is to be confessed, however, that we are not always able to ascertain when the vertebræ are in this state.

Mr. Crowther has succeeded in curing some cases of lumbar abscess without puncturing, even after large collections of matter had formed; his treatment consists in the repeated application of blisters over the integuments covering the abscess, which are to be kept open by savin cerate.

CHAPTER XXXII.

Of Curved Spine.

By this name is designated a disease, or caries, of the vertebræ, which has long been familiar to surgeons, but was never well understood until the investigations of Mr. Pott rendered its nature intelligible. I shall therefore take the following observations from his excellent treatise on the subject.

“The disease, of which I am to speak, is a disease of the Spine, producing an alteration in its natural figure, and not unfrequently attended with a partial, or a total loss of the power of using, or even of moving, the lower limbs.

“From this last circumstance (the loss of the use of the limbs) it has in general been called a Palsy, and treated as a paralytic affection; to which it is in almost every respect perfectly unlike.

“The occasion of the mistake is palpable; the patient is deprived of the use of his legs, and has a deformed incurvation of the spine; the incurvation is supposed to be caused by a dislocation of the vertebræ; the displaced bones are thought to make an unnatural pressure on the spinal marrow, and a pressure on that being very likely to produce a paralysis of some kind, the loss of the use of the legs is in this case determined to be such: the truth is, that there is no dislocation, no unnatural pressure made on the spinal marrow, nor are the limbs by any means paralytic, as will appear to whoever will examine the two complaints with any degree of attention.

“In the true paralysis, from whatever cause, the muscles of the affected limb are soft, flabby, unresisting, and incapable of being put into even a tonic state; the limb itself may be placed in almost any position or posture; if it be lifted up, and then let go, it falls down, and it is not in the power of the patient to prevent, or even to retard its fall: the joints are perfectly and easily moveable in any direction; if the affection be of the lower limbs, neither hips, knees, nor ancles, have any degree of rigidity or stiffness, but permit the limb to be turned or twisted in almost any manner.

“In the present case, the muscles are indeed extenuated, and lessened in size; but they are rigid, and always at least in a tonic state, by which the knees and ancles acquire a stiffness not very easy to overcome; by means of this stiffness, mixed with a kind of spasm, the legs of the patient are either constantly kept stretched out straight, in which case considerable force is required to bend the knees, or they are by the action of the stronger muscles drawn across each other, in such manner as to require as much to separate them: when the leg is in a straight position, the extensor muscles act so powerfully as to require a considerable degree of force to bend the joints of the knees; and when they have been bent, the legs are immediately and strongly drawn up, with the heels toward the buttocks: by the rigidity of the ancle joints joined to the spasmodic action of the gastrocnemii muscles, the patient's toes are pointed downward in such manner as to render it impossible for him to put his foot flat to the ground: which makes one of the decisive characteristics of the distemper.

“These are strong marks of the distinction which ought to be made between the two diseases; and fully sufficient to shew the impropriety of confounding them with each other.

“The majority of those who labour under this disease are infants, or young children : adults are by no means exempt from it, but I have never seen it at an age beyond forty.

“When it attacks a child who is old enough to have walked properly, its awkward and imperfect manner of using its legs, is the circumstance which first excites attention, and the incapacity of using them at all, which very soon follows, fixes that attention, and alarms the friends.

“The account most frequently given is, that for some time previous to the incapacity, the child had been observed to be languid, listless, and very soon tired ; that he was unwilling to move much, or briskly ; that he had been observed frequently to trip and stumble, although no impediment lay in his way ; that when he moved hastily or unguardedly, his legs would cross each other involuntarily, by which he was often and suddenly thrown down ; that if he endeavoured to stand still, and upright, unsupported by another person, his knees would totter and bend under him ; that he could not with any degree of precision or certainty, steadily direct either of his feet to any particular point, but that in attempting so to do, they would be suddenly, and involuntarily, brought across each other ; that soon after this, he complained of frequent pains and twitchings in his thighs, particularly when in bed, and of an uneasy sensation at the pit of his stomach ; that when he sat on a chair, or a stool, his legs were almost always found across each other, and drawn up under the seat ; and that in a little time after these particulars had been observed, he totally lost the power of walking.

“These are the general circumstances which are found, at least in some degree, and that pretty uniformly in most infants and children, but there are others which are different in different subjects.

“If the incurvation be of the neck, and to a considerable degree, by affecting several vertebræ, the child finds it inconvenient and painful to support its own head, and is always desirous of laying it on a table or pillow, or any thing to take off the weight. If the affection be of the dorsal vertebræ, the general marks of a distempered habit, such as loss of appetite, hard dry cough, laborious respiration, quick pulse, and disposition to hectic, appear pretty early, and in such a manner as to demand attention: and as in this state of the case there is always, from the connexion between the ribs, sternum, and spine, a great degree of crookedness of the trunk, these complaints are by every body set to the account of the deformity merely. In an adult, the attack and the progress of the disease are much the same, but there are some few circumstances which may be learned from a patient of such age, which either do not make an impression on a child, or do not happen to it.

“An adult, in a case where no violence hath been committed, or received, will tell you, that his first intimation was a sense of weakness in his back bone, accompanied with what he will call a heavy dull kind of pain, attended with such a lassitude as rendered a small degree of exercise fatiguing: that this was soon followed by an unusual sense of coldness in his thighs, not accountable for from the weather, and a palpable diminution of their sensibility. That in a little time more, his limbs were frequently convulsed by involuntary twitchings, particularly troublesome in the night: that soon after this, he not only became incapable of walking, but that his power either of retaining or discharging his urine and fæces was considerably impaired, and his penis became incapable of erection.

“The adult also finds all the offices of his digestive, and respiratory organs much affected, and complains constantly of pain and tightness at his stomach.

“In infants, the curve is seldom noticed till it has got to such a size and state, as to demand attention from the deformity : previous to this, all the marks of distemper which appear in the child, pass for the effects of general weakness, and are treated as such ; differently by different people, and under different circumstances, but never with any permanent good effect ; some of the adventitious symptoms, if I may so call them, are, in some degree, relieved, but the principal remain in full force, or, what is much more frequent, go on increasing.

“In an adult it passes for rheumatism, or gravel, or a strain, and the defect in the limbs is the first thing that occasions an inquiry into the state of the back bone.

“When a curvature is perceived in an infant, it is always supposed to have received a hurt by a blow, or fall, and an adult has always recourse to some exertion in pulling, drawing, lifting, or carrying, by which the spine is thought to have been deranged, or injured ; but which supposition is seldom, if ever true, in either case.

“The true cause of the disease, is a morbid state of the spine, and of some of the parts connected with it ; which distempered state of parts will, upon careful inquiry, be always found to have preceded the deformity some length of time ; in infants this is the sole cause, and external violence has nothing to do with it. In the adult, I will not assert that external mischief is always and totally out of the question, but I will venture to affirm what is equal, as far as regards the true nature of the case, which is, that although accident and violence may in some few instances be allowed to have contributed to its more immediate appearance, yet the part in which it shews itself, must have been previously in a morbid state, and thereby predisposed for the production of it. I do not by this mean to say, that a violent exertion cannot injure the spine, nor produce a paralytic complaint, that would be to say more than I know ; but

I will venture to assert, that no degree of violence whatever is capable of producing such an appearance as I am now speaking of, unless the bodies of the vertebræ were by previous distemper disposed to give way; and that no supposable dislocation, caused by mere violence done to the bones of the back, which bones were before the receipt of the injury in a sound state, can possibly be attended with the peculiar symptoms of a curved spine. In which distinction, according to my judgment, consists the very essence of the disease. Violence may easily be supposed to bring the two vertebræ nearer to each other than they ought to be, and by crushing an intermediate one to produce a curvature; but then the body of the vertebræ so crushed, must have been in a distempered state previous to such violence: great violence may also suddenly and immediately displace a perfectly sound vertebræ from its proper and natural situation, with regard to those annexed to it; but the necessary consequences of these two kinds of injury must be so very different, that they never can be confounded together, or mistaken for each other, even by the most inattentive observer.

“The true curvature is invariably uniform in being from within outwards; but it varies in situation, in extent, and in degree; it affects the neck, the back, or the loins; it comprehends one vertebra only, or two, or more; and as few or more are affected, or, as these are more or less morbid, and consequently give way more or less, the curve must be different; but whatever variety these circumstances may admit, the lower limbs alone,* in gene-

“* Since I began to put these papers together, I have seen two cases, in one of which the arms only were affected, in the other both legs and arms.

“Mr. E. Ford, of Golden Square, has favoured me with the examination and case of a lad, who lost the use of both legs, and both arms, from a curvature which Mr. Ford cured by means of the caustics. Mr. Park, of Liverpool, has also obliged me with an account of two persons, both under his care, both with useless arms and legs, and both cured by the same means.”

ral, feel the effect. Some are very soon after the curvature, rendered totally and absolutely incapable, not only of walking, but of using their legs in any manner; others can make shift to move about with the help of crutches, or by grasping their thighs just above the knees with both hands; some can sit in an armed chair without much trouble or fatigue, others cannot sit up with any help; some retain such a degree of power of using their legs, as to be able to shift their posture when in bed; others have no such power, and are obliged to be moved upon all occasions.

“Weak and delicate children are the most frequent subjects of this distemper; and when in these, it seizes on the dorsal vertebræ, great deformity of the trunk, both before and behind, is the almost inevitable and necessary consequence; this will be different in different persons; but let the difference in this be what it may, it is an adjunct circumstance; and upon due inquiry it will always be found that the curvature from within outward, preceded the other deformity, and was, at one time, the only one to be seen.

“Before the alteration of figure in the back bone has been discovered, all the attention is paid to the limbs, in which the whole disorder is supposed to reside; and all the applications for relief are made to them: frictions, liniments, embrocations, blisters, &c. to which is generally added cold-bathing and electricity; when the curvature has been noticed, recourse is immediately had to back-boards, collars, steel bodice, swings, screw-chairs, and other pieces of machinery, but all to no purpose; the patient becomes daily more and more helpless and unhealthy, languishes for more or less time, and at last dies either in an emaciated state from a hectic, or by a drain from an abscess formed within the body.

“That this is the case frequent and melancholy expe-

rience evinces, but why it is so, is perhaps not generally so well understood, or attended to as it ought to be.

“The primary and sole cause of all the mischief, is a distempered state of the parts composing or in immediate connexion with the spine, tending to, and most frequently ending in a caries of the body, or bodies, of one or more of the vertebræ: from this proceed all the ills whether general, or local, apparent, or concealed; this causes the ill health of the patient, and, in time, the curvature. The helpless state of the limbs, is only one consequence of several proceeding from the same cause; but though this effect is a very frequent one, and always affects the limbs in nearly the same manner; yet the disease not having its origin in them, no application made to them only can ever be of any possible use.

“The same failure of success attends the use of the different pieces of machinery, and for reasons which are equally obvious.

“They are all, from the most simple to the most complex, but particularly the swing and the screw, calculated to obviate and remove what does not exist. They are founded upon the supposition of an actual *dislocation*, which never is the case, and therefore they always have been and ever must be unsuccessful.

“To understand this in the clearest and most convincing manner, we need only reflect on the nature of the disease, its seat, and the state in which the parts concerned must necessarily be.

“The bones are either already carious, or tending to become so; the parts connected with them are diseased, and not unfrequently ulcerated; there is no displacement of the vertebræ with regard to each other, and the spine bends forward only because the rotten bone, or bones intervening between the sound ones give way, being unable in such state to bear the weight of the parts above. The most superficial reflection on this must point out to every

one, why attempts of this kind can do no good, and a little more attention to the subject will show why they may be productive of real, and great mischief. The bones are supposed to be sound, but displaced; these machines are designed to bring them back to their former situation, and thereby to restore to the spine its proper rectitude; if therefore they have any power, that power must be exercised on the parts in connexion with the curve; which parts, when the disease is at all advanced, are incapable of bearing such a degree of violence without being much hurt thereby: this, if it were merely theoretical, being a conclusion drawn from the obvious and demonstrable state of the distempered parts, could not be deemed unreasonable; but, unfortunately for the afflicted, it is confirmed by practice. They who have had patience and fortitude to bear the use of them to such a degree as to affect the parts concerned, have always found increase of pain and fever, and an exasperation of all their bad symptoms, and I have known more than one instance in which the attempt has proved *fatal*.

“The use of some or other of these pieces of machinery is so general, and the vulgar prejudice in their favour so great, that notwithstanding I have been long convinced of their perfect inutility, yet if I had no other objection to them, I would not attempt to rob the afflicted of what they seem to derive such comfortable expectation from; but as I am satisfied of their mischievous effects, not only in the case of the present subject, but in many others; I cannot help bearing my testimony against the indiscriminate and very improper use which is daily made of them.

“They are used with design to prevent growing children from becoming crooked or misshapen, and this they are supposed to do by supporting the back-bone, and by forcing the shoulders unnaturally backward; the former they cannot do, and in all cases where the spine

is weak, and thereby inclined to deviate from a right figure, the latter action of these instruments must contribute to, rather than prevent such deviation; as will appear to whoever will with any attention examine the matter: if, instead of adding to the embarrassments of children's dress by such iron restraints, parents would throw off all of every kind, and thereby give nature an opportunity of exerting her own powers; and if in all cases of manifest debility recourse was had to friction, bark, and cold bathing, with a due attention to air, diet, exercise, and rest, the children of the opulent would, perhaps, stand a chance of being as stout, as straight, and as well shapen as those of the laborious poor.

“When a child appears to be what the common people call naturally weakly, whatever complaints it may have are supposed to be caused by its weak state, and it is generally believed that time and common care will remove them; but when a curvature has made its appearance, all these marks of ill health, such as laborious respiration, hard cough, quick pulse, hectic heat and flushing, pain and tightness of the stomach, &c. are more attentively regarded, and set to the account of the deformity consequent to the curve, more especially if the curvature be of the dorsal vertebræ, in which case the deformity is always greatest: but whoever will carefully attend to all the circumstances of this disorder, will be convinced, that most, if not all the complaints of children, labouring under this infirmity, precede the curvature, and that a morbid state of the spine, and of the parts connected with it, is the original and primary cause of both.

“I have in the former edition informed the reader, that my particular attention to this disease was first excited by an instance of its being cured by a seemingly accidental abscess; that this first gave me reason to suspect, that we had mistaken an effect for a cause, and, that

upon mature deliberation upon the matter, I was still more inclined to think so, for the following reasons.

1. "That I did not remember ever to have seen this useless state of the limbs from a mere mal-formation of the spine, however crooked such mal-formation might have made it.

2. "That none of those deviations from right shape, which growing girls are so liable to, however great the deformity might be, was ever attended with this effect.

3. "That the kind of deformity, which was attended with this affection, of the limbs, although it was different as to its degree, and its extent in different people, yet it was uniform in one circumstance, which was, that the curvature always was from within outwards.

4. "That since I had been particularly attentive to the disorder, I thought that I had observed, that neither the extent, nor degree of the curve, had in general produced any material difference in the symptoms, but that the smallest was when perfectly formed, attended with the same consequences as the largest.

5. "That although it had sometimes happened, that a blow, or a strain, had preceded the appearance of the curve, yet it much more frequently happened, that no such cause was assignable.

6. "That I had observed exactly the same symptoms in infants, and in young children, who had neither exerted themselves, nor were supposed to have received any injury from others; and that the case was still the same in those adults, who had no such cause to look to.

7. "That although it might be expected, that a dislocation of any of the vertebræ, would be attended with symptoms of the paralytic kind, yet they would be very unlike to those which affected the limbs in the present case."

"The suspicions which these circumstances had excited in my mind, were confirmed by what I had a few op-

portunities of observing, in the dead bodies of some who had died afflicted with this disorder, and altogether satisfied me, that there must be something predisposing in the parts concerned ; and that when we attribute the useless state of the limbs merely to the curvature, we mistake, as I have just said, an effect for a cause.

“ At the same time I gave an account of a conversation, which passed between me and the late Dr. Cameron, of Worcester, who told me, that having remarked in Hippocrates, an account of a paralysis of the lower limbs, cured by an abscess in the back, he had, in a case of useless limbs attended with a curvature of the spine, endeavoured to imitate this act of nature by exciting a purulent discharge, and that it had proved very beneficial ; which was confirmed to me by Mr. Jeffrys, of Worcester, who had made the same experiment with the same success.

“ From the time of my receiving this first information to the present, I have sought every opportunity of making the experiment ; St. Bartholomew’s hospital has seldom been without cases of this kind, and it is with infinite pleasure and satisfaction, that I find myself enabled to say, that in all cases where the complaint has been so circumstanced as to admit of even probable expectation, the attempt has been successful.

“ If the cure of this most dreadful distemper had depended upon an application to the constitution in general, it might have required a variety of medicines, the administration of which must have demanded judgment in adapting them to particular persons and constitutions ; and it must also, in the nature of things, have happened that many individuals could not have been benefited at all. But fortunately for the afflicted, the means of relief are simple, uniform, and safely applicable to every individual, under almost every possible circumstance, not attended by the smallest degree of hazard, and capable of

being executed by any body who has the least portion of chirurgic knowledge : it consists merely in procuring a large discharge of matter, from underneath the membrana adiposa on each side of the distempered bones forming the curvature, and in maintaining such discharge until the patient shall have recovered his health and limbs. They who are little conversant with matters of this sort, will suppose the means very inadequate to the proposed end ; but, they who have been experimentally acquainted with the very wonderful effects of purulent drains, made from the immediate neighbourhood of diseases, will not be so much surprised at this particular one ; and will immediately see how such kind of discharge, made, and continued from the distempered part, checks the further progress of the caries, gives nature an opportunity of exerting her own powers, of throwing off the diseased parts, and of producing by incarnation an union of the bones (now rendered sound) and thereby establishing a cure.

“ However, be all this as it may, the fact is undoubted, and the number of witnesses, as well as patients producible in confirmation of it is so considerable, that it is needless to say any thing more on that head.

“ It is a matter of very little importance towards the cure, by what means the discharge be procured, provided it be large, that it come from a sufficient depth, and, that it be continued for a sufficient length of time.*

“ I have tried the different means of setons, issues by incision, and issues by caustic, and have found the last in general preferable, being least painful, most cleanly, most easily manageable, and capable of being longest continued.

“ The caustics should be applied on each side of the

* “ When I say this, I mean to signify that it is absolutely without limitation, and must depend on their beneficial effect.”

curvature in such a manner as to leave the portion of skin covering the spinal processes of the protruding bones, entire and unhurt, and so large, that the sores upon the separation of the eschars, may easily hold each three or four peas in the case of the smallest curvature ; but in large curves, at least as many more.

“These issues should not only be kept open, but the discharge from them should be maintained by means of orange peas, cantharides in fine powder, ærugo æris, or any such application as may best serve the intended purpose, which should be that of a large, and long continued drain.

“Whatever length of time it may take to obtain a complete cure, by restoring the health as well as the limbs, the issues must be continued at least as long ; and in my opinion, a considerable time longer, especially in the persons of infants and growing children ; the necessity of which will appear more strongly, when it shall be considered that infants and young children of strumous habits, are the subjects who are most liable to this distemper, and that in all the time previous to menstruation in one sex, and puberty in the other, they are in general more served by artificial drains than any other persons whatever.

“This, and this only, does or can alleviate the misery attending this distemper, and in proper time effect a cure.

“By means of these discharges, the eroding caries is first checked, and then stopped ; in consequence of which an incarnation takes place, and the cartilages between the bodies of the vertebræ having been previously destroyed, the bones become united with each other and form a kind of ankylosis.

“The time necessary for the accomplishment of this, must in the nature of things, be considerable in all ca-

ses, but very different according to different circumstances.

“No degree of benefit or relief, nor any the smallest tendency towards a cure is to be expected, until the caries be stopped, and the rotten bones have begun to incarn; the larger the quantity of bones concerned, and the greater degree of waste and havock committed by the caries, the greater must be the length of time required for the correction of it, and for restoring to a sound state so large a quantity of distempered parts,—and vice versa.*

“In the progress towards a cure, the same gradation or succession of circumstances may be observed, as was found to attend the formation of the disease, with this difference, that they which attend the latter, are much more rapid than those which accompany the former.

“After the discharge has been made some time, very uncertain what, the patient is found to be better in all general respects, and if of age to distinguish, will acknowledge that he feels himself to be in better health; he begins to recover his appetite, gets refreshing sleep, and has a more quiet and less hectic kind of pulse, but the relief which he feels above all others, is from having got rid of that distressing sensation of tightness about the stomach; in a little time more a degree of warmth, and a sensibility is felt in the thighs, which they had been strangers to for some time; and generally much about the same time, the power of retaining and discharging the urine and fæces begins to be in some degree exerted.

“The first return of the power of motion in the limbs is rather disagreeable, the motions being involuntary and

* “Nothing can be more uncertain than the time required for the cure of this distemper. I have seen it perfected in two or three months, and I have known it require two years; two thirds of which time passed before there was any visible amendment.”

of the spasmodic kind, principally in the night; and generally attended with a sense of pain in all the muscles concerned.

“At this point of amendment, if it may be so called, it is no uncommon thing, especially in bad cases, for the patient to stand some time without making any farther progress; this in adults occasions impatience, and in parents despair; but in the milder kind of case, the power of voluntary motion generally soon follows the involuntary.

“The knees and ancles by degrees lose their stiffness, and the relaxation of the latter enables the patient to set his feet flat upon the ground, the certain mark that the power of walking will soon follow; but these joints having lost their rigidity, become exceedingly weak, and are not for some time capable of serving the purpose of progression.

“The first voluntary motions are weak, not constantly performable, nor even every day, and liable to great variation, from a number of accidental circumstances, both external and internal.

“The first attempts to walk are feeble, irregular, and unsteady, and bear every mark of nervous, and muscular debility; the patient stands in need of much help, and his steps, with the best support, will be, as I have just said, irregular and unsteady; but when they have arrived at this, I have never seen an instance in which they did not soon attain the full power of walking.

“When the patient can just walk, either with crutches, or between two supporters, he generally finds much trouble and inconvenience, in not being able to resist, or to regulate, the more powerful action of the stronger muscles of the thigh over the weaker, by which his legs are frequently brought involuntarily across each other, and he is suddenly thrown down.

“Adults find assistance in crutches, by laying hold of chairs, tables, &c. but the best and safest assistance for a child, is what is called a go-cart, of such height as to reach under the arms, and so made as to enclose the whole body: this takes all inconvenient weight off from the legs, and at the same time enables the child to move them as much as it may please.

“Time and patience are very requisite; but they do in this case, as in many others, accomplish our wishes at last.

“The deformity remaining after recovery is subject to great uncertainty, and considerable variety, as it depends on the degree of caries, and the number of bones affected: in general, it may be said, that where one vertebræ only is affected, and the patient young, the curve will in length of time almost totally disappear; but where two or three are affected, this cannot be expected; the thing aimed at is the consolidation and union of the bones, which had been carious, and are now become sound: this is the *sine qua non* of the cure, and this must in such cases render the curvature, and consequently the deformity, permanent: the issues will restore the use of the limbs, but not the lost figure of the spine.” (POTT.)

Since the introduction of this method of treatment into general use many cures have been effected of this formerly incurable disease, and the practice of Mr. Pott has been approved and adopted by all modern surgeons. In some instances advantage is derived from machinery so constructed as to support the head, but this is not often required.

The curvature of the spine resulting from rickets is generally distinguishable from that in which the vertebræ are carious. In rickets, the curvature is gradual and extends throughout the whole spine; it is also very irre-

gular, and the spine is bent in several different directions—in cases of caries a few of the vertebræ only are affected, and the curve is more abrupt and angular. In rickets too the other bones of the body are generally affected;—the sternum projects;—the ribs are depressed;—the bones of the pelvis fall inwards;—the clavicles are prominent;—the os humeri bulges outwards;—the thighs are curved forwards and outwards;—the knees are bent inwards;—the tibia is unusually convex and prominent;—and the feet turn outwards. In short the whole skeleton in rickety subjects is deformed, and the whole appearance of the patient is feeble and sickly; whereas the disease of the spine which has been described, is purely local, and appears to be unattended with any primary constitutional affection.

Attempts have been made to cure the disease of the spine by simply confining the patient to bed. Of the success of this treatment I have no information, but it should certainly not supercede the employment of issues, from which so much benefit has been found to result.

CHAPTER XXXIII.

Of Paronychia or Whitlow.

PARONYCHIA, Panaris, or Whitlow is a very painful and distressing inflammation seated at the end of a finger or thumb generally terminating in suppuration.

It is usually divided into four species, which differ merely in the degree and situation of the inflammation.

The *first species* is the least severe. It is seated near the root or side of the nail, and when it suppurates, matter is formed immediately under the cuticle, and the inflammation appears to extend no deeper than the true skin. When, however, in this case the matter forms under the nail, as it sometimes does, great pain results from its confinement.

In the *second species* of whitlow the inflammation occurs under the true skin, and commonly near the extremity of the finger. The pain is very great, probably because the skin of the finger does not admit of ready distention in the inflamed vessels, and when suppuration takes place the matter is confined, and the abscess does not soon open.

The *third species* is that in which the inflammation is still more deeply seated, and affects the parts within the theca covering the flexor tendons. In this case the inflammation and suppuration frequently extend along the tendons to the wrist, and even to the elbow.

In the *fourth species* the periosteum and sometimes the bone inflames. In this case the inflammation and suppuration do not generally extend so far as in the third species.

In the two last cases the pain is very excruciating, and there is no great tumefaction evident.

Besides these four species of whitlow a fifth has been noticed affecting the bone exclusively, attended with extreme pain, continuing for weeks and months with intervals of ease, and occasional exacerbations. In one such case the finger is stated by Richter to have been removed, and the bone on examination was found entirely destroyed and changed into a fatty substance.

The causes of whitlow are not always known; vicissitudes of temperature frequently occasion it. I have seen more cases of whitlow among washerwomen than in any other class of persons. Punctured wounds have sometimes produced paronychia.

The most distressing cases of the disease are those in which the inflammation and suppuration proceed along the tendons, under the aponeurosis palmaris, and under the annular ligament of the wrist to the fore arm. Sometimes gangrene results, and limbs have been amputated in consequence of whitlow, and death has in some cases followed this apparently trivial complaint.

TREATMENT.

The manner of treating paronychia varies somewhat according to the situation of the inflammation. In the first species it is necessary to evacuate the matter as soon as it forms, and in general it readily heals; the best application is the common epulotic cerate. If matter form under the nail it can be plainly seen, and must be evacuated, by scraping the nail very thin with glass or a sharp knife and then dividing it with a bistoury.

When the inflammation is deeper seated and great pain results, the patient should be bled and purged. The application of leeches is also very effectual in abating the inflammation. A blister should be applied over

the part. In some cases advantage has been obtained from rubefacients, as hot water, &c. but the blister is to be preferred. As soon as matter forms, however, it should be evacuated by a free incision, and whenever paronychia is attended with severe pain, and the skin is not very red and sensible, we may infer that the inflammation is situated in the tendon or periosteum, and therefore an early and free incision in the direction of the tendon should be made down to the bone, which generally procures very speedy relief, evacuates matter if it be already formed, removes the tension of the parts if suppuration have not taken place, and substitutes a simple incision which will readily heal, for a most obstinate, painful, and dangerous malady.

When matter travels along in the course of the tendons, free incisions should be made for its evacuation, and if carious bone be found it should be extracted as soon as it becomes sufficiently loose.

It often happens that the tendons exfoliate or slough, a tedious process which prolongs the disease and prevents the soft parts from healing. In these cases if practicable, the diseased tendon should be cut off, and with it a small portion of the sound tendon, for unless the incision be made in a sound part the cure will not be expedited, since the absorbents will have still their work to perform.

Fungus sometimes protrudes through the external opening, which should always in such cases be enlarged, to give free vent to confined pus, and to remove all stricture from the inflamed parts.

CHAPTER XXXIV.

Of Amputation of the Limbs.

WHAT the surgeon cannot cure he removes by his knife. If his art were perfect he would never amputate, but in the present state of medical science even this terrible operation is occasionally demanded. The modern improvements of surgery have lessened the number of cases which call for amputation, and have greatly mitigated its horrors, but it still leaves the patient a *mutilated* victim, and it is an operation "terrible to bear and dreadful to behold."

It is important for a surgeon to be well convinced of the propriety of amputation before he resolves upon it. He should never consider it as one of his remedies, but as an apology for their inefficacy, and notwithstanding this he should be ready to amputate when necessity demands it, and prompt to decide when that necessity exists.

It is customary in systematic works to collect together a number of aphorisms to regulate the practitioner on the present occasion. I shall comply with the custom to a certain extent, premising that exceptions may be as numerous as the rules, and in many cases the best practice will consist in violating the best general directions, and a familiar acquaintance with every principle of surgery will be necessary in forming a judgment upon the endless variety of cases which may involve the question of the propriety of amputation.

I. COMPOUND FRACTURES have been supposed to render amputation necessary. We have already remarked

(page 110, vol. 1.) that a broken bone affords no just reason for the operation. The concomitant injury and the circumstances under which the attempt to cure the patient will be made are the principal things to be taken into consideration. On the field of battle, or in the cock-pit amputation is warrantable and proper, in cases which would not justify it in the comfortable residence of an affluent citizen. To anticipate the particulars of each case is impossible.

II. COMPOUND DISLOCATIONS are of a very serious nature, and are often complicated with other important injury to a limb. In hot weather such accidents not unusually terminate in tetanus—sometimes in gangrene—often in violent inflammatory fever—or in a profuse discharge of pus, and consequently great exhaustion and hectic fever. In these cases amputation is therefore a subject of serious deliberation. The dangers should be stated fairly and freely to the patient and his friends, and the surgeon should rather direct and inform, than control their decision, always bearing in mind that many desperate cases get well under judicious and attentive treatment.

III. EXTENSIVE WOUNDS. Many wounds occur which render amputation indispensable. A limb is shot off by a cannon ball—It is lacerated by a splinter and all its important blood-vessels torn open. Under such circumstances immediate amputation substitutes a simple incision for a ragged, lacerated, dangerous wound. In these cases no time should be lost. Ranby or Wiseman relates a case in which a sailor in an engagement had one of his arms shattered, went to the cock-pit, and after it was amputated sprung upon deck, nothing daunted, and assisted with the other to traverse a gun. The operation is better borne immediately after the accident than at any other time.

IV. MORTIFICATION. When a limb mortifies from

want of blood, or from excessive inflammation, the absorbents if left to themselves will perform the amputation but in a slow and slovenly manner, and an irregular stump will be left. The surgeon should never amputate whilst mortification is progressive, but if necessary afterwards he may perform the operation for the purpose of expediting the cure.

V. DISEASED JOINTS ;—CANCEROUS AND OTHER INCURABLE ULCERS, sometimes render amputation necessary. The great exhaustion of the patient, and his apparently approaching death, are the only good reasons for amputating in such cases, since many diseases supposed incurable get well, and yet there are no instances where the benefit arising from amputation is so great and so immediate, as in cases such as we are now contemplating. I have known a pulse too frequent to be counted, become nearly natural in a few hours after the amputation of a scrofulous knee—the hectic was immediately relieved—the night sweats subsided—the strength rapidly returned, and in a few days, from the brink of the grave the patient was snatched to a place of safety, and speedily restored to health.

VI. CERTAIN TUMOURS rapidly increasing, or tending to end in incurable ulcers, as, the fungus hematodes—certain exostoses, or bony excrescences—caries of the bones of a joint and limb. These and other incurable affections of a like nature, warrant and demand the amputation of a limb.

Hæmorrhage may generally be stopped without amputation, and aneurisms no longer afford a pretext for the operation, though many limbs have been lost in consequence of a deficiency of knowledge as to the proper treatment of these cases. The tying-up of the artery supplying a limb, should be preferred to amputation.

Mr. Boyer in his clinical lectures at the hospital La Charité, recommended amputation of the leg in cases of dislocated astragalus, even when unattended with a wound, but for this practice I think there is no excuse.

Compound luxations do not afford a sufficient reason for amputation, and in the opinion of most surgeons, unless they be attended with very extensive injury to surrounding parts, the operation ought not to be done. In a simple luxation therefore the practice of Mr. Boyer should never be imitated.

Mr. Larrey recommends amputation as a cure for tetanus, in cases where this disease results from gun shot wounds. In some cases I have known this practice tried, but always without success.

For a number of very interesting observations on the present subject, the reader is referred to a masterly performance of Mr. Pott, entitled "Remarks on the necessity and propriety of the operation of amputation in certain cases and under certain circumstances."

CHAPTER XXXV.

Amputation of the Thigh.

WHEN the thigh is amputated in consequence of a diseased knee, the limb should be removed as low down as possible without cutting in diseased parts. Previously to this, and every painful operation, a dose of laudanum should be administered.

The instruments necessary, are, a tourniquet—a compress bandage—a large amputating knife—a scalpel—a retractor—a saw—bone nippers—sponges and warm water—a tenaculum—needles and ligatures—adhesive plasters—dry lint—lint spread with cerate—a pledgit of tow—and a muslin roller.

It is best, in order to avoid embarrassment, to provide two knives and two tourniquets, as accidents have sometimes rendered one of these instruments useless.

The patient should be seated on a table covered with a folded blanket (a dining table with the leaves down is very convenient) he should be supported by pillows, or by an assistant who takes him in his arms. The end of a roller folded to the thickness of a compress bandage is to be applied over the femoral artery at the upper and inner part of the thigh, and is to be kept in that situation by one turn of the roller, over which the tourniquet is applied and buckled. The chief precautions in the application of the tourniquet are, to observe that the buckle is three or four inches distant from the screw, and that the two plates of the instrument are in contact. The reason of these directions will appear obvious to any

person who examines the operation of the instrument; I have known the strap broken in consequence of the buckle coming in contact with the lower plate whilst the surgeon was screwing forcibly, and it has happened that the whole effect of the tourniquet has been lost in consequence of the remoteness of the plates at the time of its application. The tourniquet being buckled on is to be screwed until the circulation is completely stopped, which can be ascertained by examining the anterior tibial artery, where it passes over the top of the foot. When the thigh is amputated very high up, the artery may be compressed by the thumb of an assistant in the groin, and in case a tourniquet breaks, it is easy in this manner to arrest the hemorrhage till another is applied.

The surgeon takes the position which he finds most convenient, on either side of the patient (and this he should do in all amputations since there is no important reason for preferring one side to the other, except his convenience at the time.) One assistant takes hold of the leg, the limb being grasped by another who draws the skin moderately up and thereby renders it tense. The surgeon with his large knife makes a straight incision completely round the limb, extending in depth through the skin and fat, down to the fascia femoris. This skin and fat are then to be dissected loose from the fascia, and for this purpose the amputating knife is exchanged for a scalpel; when a sufficiency of integument is thus separated to cover the end of the stump, it is to be reverted, and held back by an assistant. The surgeon again takes the amputating knife, and divides the muscles down to the bone, close to the reverted integuments. In this stage of the operation he should guide the edge of the knife by his eye, and be particularly cautious not to cut through the skin turned up, a piece of awkwardness utterly in-

excusable. The retractor, a piece of slit linen or leather, is now applied to defend the muscles from the saw, and the assistants holding the limb above and below very steadily, the surgeon proceeds to saw through the bone. The cautions I wish to offer on this stage of the operation, are, not to scrape up with a knife the periosteum from the bone—a useless, painful, and tedious business, and one which will be apt to occasion exfoliation. 2. To use long strokes of the saw, which prevents the choaking of the teeth, and expedites the operation. 3. Never to use a saw in which the teeth are not set wide, so as to make a groove wider than the thickness of the blade of the saw. If this be not attended to the saw hitches in the bone, its motions are irregular, and the bone often breaks off before it is cut through. The limb being thus removed, the surgeon proceeds to tie the femoral artery with a strong ligature; he will easily see it near the bone, and probably several other large vessels will be obvious each of which is to be drawn out by a tenaculum and tied in succession. The tourniquet is now to be loosened, and a jet of blood takes place from every considerable artery not yet secured; these are all to be taken up, and the stump cleansed with warm water and a clean sponge. The tourniquet and compress are now to be taken off.

The bleeding having ceased, it is proper to wait a few minutes, and give the patient a little wine to excite the circulation, as a fainty state often stops the bleeding for a time before the arteries are secured.

If no blood flows the skin is to be drawn over the end of the stump, wiped dry, and carefully approximated, and it is of no importance whether this be done in a line from side to side, or from before backwards. The ligatures are to be brought out at each angle of the wound, and a small *piece of lint* interposed between *the edges of the skin*, in order to prevent the union of the skin be-

fore the flap and muscles have united. A caution of much importance, as the neglect of it has occasioned in many cases an abscess to form from the confinement of blood and serum under the flap which have greatly retarded the cure. The occurrence of this accident is I believe a very principal reason why the French surgeons do not avail themselves of the adhesive inflammation in the present case. They believe it impossible for the skin and muscles to unite by the first intention, and they consequently cover the stump with lint. The fact is, much of the union will be accomplished by the first intention, if the plan I have suggested be adopted. Straps of adhesive plaster are now to be applied in order to secure the skin in its proper situation ; over this a pledgit of lint spread with simple cerate, and over this pledgit another of fine tow, which is to be secured by a roller. The malta cross—the elongates—the knitted cap—are all useless envelopes ; the best of all is a roller properly applied. This roller is to be passed repeatedly round the lower part of the thigh, and after crossing the stump in opposite directions, is to be carried by circular turns up to the hip, and passed once or twice round the loins to prevent it from slipping down. The tourniquet is now loosely applied around the top of the thigh to be ready in case of bleeding, and the patient is laid on a mattress. The stump being placed on a pillow, a cradle is to be fixed over it as in cases of fracture to prevent the pressure of the bed clothes.

The patient should be kept at rest—some pain and soreness of the thigh may be expected, but the stump should not be touched till the eighth day in cool weather, or the fourth or fifth day in summer, at which time it is to be dressed.

In removing the dressings great caution must be used. The bandages should be well soaked in warm water,

and poulticed for some hours, if necessary, to soften them.

The dressings are to be reapplied as at first, and this should be repeated once in forty-eight hours, and after the third or fourth dressing every day. The ligatures generally come away in a fortnight, and the stump in a successful case heals in three or four weeks.

If there be any reason to suppose the femoral artery in a diseased state, and especially if it be found ossified, it will be proper to take it up with a needle, and the ligature should include a portion of the surrounding substance. It is of no great consequence to avoid enclosing a nerve in the knot, for I am convinced that this is often done without occasioning spasms of the stump or any other inconvenience; nevertheless I do not recommend it to be done if it can be conveniently avoided.

When the patient begins to use a wooden leg, great care should be taken to prevent ulceration of the stump.

CHAPTER XXXVI.

Amputation of the Leg.

THE method of amputating the leg which I shall recommend, is one very easily performed, and equally successful with any other ; avoiding therefore, as usual, a history of successive improvements, I proceed to describe it in the manner in which it has been for many years performed by Dr. Physick.

The instruments and previous preparations are the same as have been recommended for amputation of the thigh, with the addition of a catlin, or double edged knife, and a retractor with three instead of two tails.

The tourniquet need not be placed so high upon the thigh, but it is better to affix the compress under it at the spot where the femoral artery is tied in cases of popliteal aneurism, and not as has sometimes been advised, low down near the knee, because the ham strings take off much of the pressure from the artery and render it necessary to screw it much tighter.

The circulation being commanded, an assistant holds the foot and leg steady, another secures the knee, and the surgeon standing if *convenient** on the inside of the knee, makes an incision with the amputating knife about five inches below the patella, in front ; extending considerably lower down behind, so as to be more distant from the knee behind than before. This incision is to be carried regularly round the limb, and deep enough to

* I use this word, because, the direction of the light, the number of attendants, the size of the apartment, and many circumstances, may interfere with this arrangement.

divide the skin and adipose matter down to the fascia covering the muscles. With a scalpel the integuments are to be dissected loose and turned back, the surgeon taking care to reserve enough to cover the stump, and no more. A flap will in this manner be formed, consisting of the skin and cellular membrane, which should meet just behind the tibia, of course about one inch of skin should be reserved in front. When this flap is turned back, with the amputating knife, or catlin (which Mr. C. Bell prefers) the surgeon proceeds to divide the muscles down to the bones, and inserting the catlin between the tibia and fibula, he divides the interosseous flesh and ligament. The retractor is next applied, one strip being interposed between the bones, and being drawn up by an assistant so as to protect the muscles, the surgeon saws through the bones in such a manner as to cut through the fibula by the time the tibia is about half divided: the object of this is to prevent the lesser bone from breaking into splinters, when the support of the greater is removed. Any spiculæ which may project from either bone, can be removed with the nippers, and afterwards the arteries are to be taken up. There are generally three which may readily be found: the *anterior tibial* between the bones, and a little anterior to the interosseous ligament; the *posterior tibial* lying a little to the inside of the former vessel near the tibia; and, the *fibular artery*, near to, and behind, the fibula. The tourniquet being loosened, other vessels will be observed, and these must successively be taken up.

The dressings are to be applied in the same manner as when the thigh is taken off, except, that in folding the skin over the tibia, care must be taken not to compress it by the plasters or dressings too firmly, as the sharp edge of the bone sometimes occasions ulceration.

In many cases the disease for which a leg is removed, is situated on the foot, at the ankle, or so low in the leg

that the surgeon may choose at what part to amputate. In these cases if the patient be wealthy, and not very desirous of walking much after his cure, we may cut the leg low down, within a few inches of the ankle, and a cork supplement can be adapted to the stump; but in persons accustomed to labour, it will be best to operate near the knee, and have a wooden leg adapted to the flexed knee, so that the patient may bear his weight upon originally formed parts, which are not so liable to ulcerate as the surface of a cicatrized stump.

The operation last described is adapted to the removal of any part of the limb between the ankle and knee, and I believe possesses all the real advantages of the common flap operation.

If the ligatures do not remain long enough to retard the cure, the stump, in a healthy patient, generally heals in three or four weeks. It is a great desideratum to be able to remove ligatures when they cease to be necessary.

CHAPTER XXXVII.

Amputation of the Arm.

THE amputation of the arm above the elbow, resembles so much that of the thigh, that it is unnecessary to describe it.

The amputation below the elbow resembles very much that of the leg, except that instead of the oblique incision through the integuments, a circular or straight incision is made.

After amputating the arm, it is unnecessary to prevent by interposing a piece of lint, the union of the wounded skin, because the cut surfaces are so small that union by the first intention often takes place throughout the stump, the whole of which heals as soon as the ligatures come away. I have amputated a fore-arm, and in ten days found the stump entirely healed.

When the arm is taken off near the wrist, some inconvenience results from the irregular contraction of the muscles, in consequence of which the tendons protrude very unequally from the stump; those which project are easily however removed with the scissors. One of the most common cases demanding the amputation of the fore arm, is the bursting of a fowling piece, the left hand being placed near the breech of the gun, receives the load, and becomes so much shattered that it is impossible to save it, and immediate amputation becomes requisite.

CHAPTER XXXVIII.

Of amputation of the shoulder joint.

THIS is a very serious operation, and may become necessary from gun-shot wounds, from exostoses or bony tumours of rapid growth near the head of the humerus, from fungus hematodes and certain analogous cases.

The operation of removing the arm at the shoulder joint, was first performed by the elder Morand and afterwards by Le Dran, who describes very particularly the manner in which he operated. Various modes have since been adopted, which I shall not detail, but, having never had occasion to perform the operation on the living body, I shall describe the manner in which it is done by the most celebrated surgeons of the present day.

The French surgeons amputate at the shoulder in the following manner. The patient is seated on a chair, his head leaning against the breast of an assistant; the operator placed at the external side of the limb, makes a first transverse incision down to the bone, at the inferior and anterior part of the deltoid muscle; a second incision is made longitudinally from the coracoid process to the internal angle of the first; and a third posteriorly, from the level of the articulation to the external extremity of the transverse incision; having thus cut the flap, he dissects it and turns it up, pressing the lower part of the arm against the trunk, to make the head of the humerus project, he then cuts the tendons of the teres minor, supra-spinatus, infra-spinatus, and biceps muscles; this done he rotates the arm backwards, cuts

the ligaments of the articulation, luxates the arm backwards, compresses the flesh, by which the arm is yet held to the trunk, and lastly stops the hemorrhage from the brachial artery, and finishes the formation of the flap; the arm being separated from the trunk, he immediately proceeds to apply the ligatures, bring back the flap, and secure it by adhesive plaster, lint, compresses, &c. This operation will be less painful, and more quickly executed, if the external flap is formed by a single stroke, by using a double edged-knife, with which the surgeon may divide the deltoid at its base, and passing from top to bottom along the bone, until it comes within four fingers breadth of the articulation where the flap terminates. This mode of operating has been practised with great dexterity by professor Dupuytren, and is particularly described in the first volume of the *Dictionnaire des Sciences Medicales*," published at Paris in 1802.

The celebrated and venerable Mr. Cline of London, has contrived an operation, much more simple than this. My friend Dr. J. A. Smith of New-York who has seen Mr. Cline operate, thus describes to me his operation. "The artery being previously secured by pressure on the first rib, an assistant takes hold of the arm, and pulls it from the body obliquely downwards, the surgeon being provided with a narrow knife, takes up with his left hand as much of the deltoid muscle as he thinks will be sufficient to form a flap to cover the wound. The knife is then introduced in such a direction as to pass slant-wise between the acromion process and the head of the humerus; around the head of that bone the instrument makes a semicircular sweep within the glenoid cavity, dividing at one stroke all the muscles which connect the arms with the scapula and body. The whole operation is little more than a simple incision, and is performed with a facility perfectly astonishing to those who see it for the first time, and if the surgeon have formed

his flap of the proper size, it covers the wound with great accuracy."

This operation, once considered among the most terrific in surgery, has become familiar among military surgeons, and in consequence of its frequent performance of late years, has almost ceased to be an object of dread, and Mr. Guthrie declares "that this once formidable operation may be considered as safe, as simple, and as little hazardous as any other of importance performed on the human body." I shall subjoin some of his observations respecting it.

"This operation has until lately been considered of the utmost danger and importance, not only to the life of the person who is unfortunately the sufferer, but to the reputation of the surgeon who has the performance of it: many and various have therefore been the methods recommended for conducting it, all impressing on the mind of the operator the great extent of danger, and tending to disturb the steadiness of his judgment. Anatomy, which has thrown so much light on operative surgery in general, has not failed in the last few years to dispel the cloud that obscured this part of military surgery; and experience has proved it to be as simple, easy, and safe an operation, as any other of importance performed on the field of battle. The knowledge acquired from this source of its success, has given to military surgeons a confidence in performing it, that divests it of half its former terrors, and by removing from the mind of the patient the idea of his having suffered a hopeless operation, diminishes the subsequent danger, and most materially aids his recovery. The dread formerly entertained of this operation was very great, even by men of the best abilities; and under certain circumstances in domestic surgery, it may still be tedious. It can never however again be considered formidable in

military surgery, except under bad management, and from extreme ignorance.

The distinction between the necessity of the operation, and the possibility of avoiding it, requires in many cases the exercise of the nicest judgment, and a due consideration of attending circumstances; for there is no part of military surgery, in which an operation can be performed with more advantage at the instant; or, delayed for a few days with a view of gaining information, with more prejudice; inasmuch as the necessary incisions are made in the first instance, in parts disposed to take on healthy actions, and in the best possible state for undergoing surgical operations. The constitution of the patient being also at that moment generally good, and able to sustain the demands upon it, under untoward circumstances; or of supporting, without future injury, the restraint and control requisite for the successful accomplishment of the cure.

The difference between cutting in sound and diseased parts is justly appreciated by every surgeon, both as to his personal convenience and ease in operating, as well as to the future healing of the wound; and the advantage here is particularly great, as from the contiguity of the wound to the chest and the principal organs of life, it is advisable to avoid any excess of action; and experience has demonstrated that the evil to be apprehended from the equilibrium of the circulation being destroyed, is infinitely less than it would be at a subsequent period of three or four weeks, after high suppurative action has been going on. In the latter, the operation is delayed until the parts to be divided have been long carrying on an increased action, and may even be diseased. The health and strength of the patient have been so much reduced, that he may be unable to support the additional pain and shock of the operation, which increase with the delay, or of giving that assistance requisite for the

consolidation of the wound. Another and great consideration, is the ease and safety with which a person can be moved after the operation, compared with the danger and pain resulting from the disturbance of broken bones, the increase of inflammation, and other attendant evils under the same circumstances. It cannot be therefore too strongly impressed on the mind, that the necessary examinations should take place; and the operation be performed in those cases demanding it, as soon after the injury as possible, consistent with the state of the patient; and the surgeon should not satisfy himself with the idea of being able to accomplish it as safely, or as successfully, when suppuration has been established, and when perhaps he may have better assistance at hand; a kind of self deceit that is occasionally permitted, but which cannot be too much reprobated.

The importance of the arm is so great, and even a limited use of it so valuable, that much should be hazarded to save it, when there is a tolerably fair prospect of success: the situation also and structure of the upper extremity, together with the command the surgeon has over it, and the less proportionate inconvenience resulting from a severe wound in that part to any other of equal value, renders its preservation after a serious injury, more practicable, and less dangerous than is frequently supposed. The operation should not therefore be performed, unless simple amputation by the flap operation cannot be successfully accomplished; or, where the limb is evidently destroyed, or, the injury seriously affecting the articulation itself, while the general health of the patient, or the unfortunate circumstances of situation, render the attempt at a farther perseverance in saving the limb improper.

Injuries from musket-balls penetrating the capsular ligament, attended with fracture and destruction of the head and adjacent parts of the humerus, and wounding

the axillary artery, require immediate operation.* A simple penetrating or incised wound of the joint, of small extent, does not call for any operation, as the patient, with due care, will escape with a certain degree of loss of motion, and of debility in the joint; nor is it proper in a wound from a musket-ball, where there is even some partial injury of the bone, as these cases frequently do well, and the patient preserves the use of the fore-arm.

Mr. Guthrie proceeds to state at great length, “accidents in the field,” and “subsequent occurrences,” which may demand the operation: for these the reader is referred to his work.—

It is now time to correct another misapprehension that the fear of hæmorrhage has introduced into this operation; I allude to the idea prevalent amongst many surgeons, that it is to be performed in a different manner from any other of importance; that instead of the calm, steady determination that distinguishes a surgeon of ability, who feels himself master of his subject, he is to forget or lay aside, what on all other occasions is considered most valuable, and endeavour to attain a peculiar precipitation and haste of manner, that is excluded from all other parts of surgery. There is still a practical point usually overlooked, that in military surgery there is little or no arm left to use as a lever in facilitating the operation, and that the separation of the head of the bone depends upon the surgeon, and not upon the assistants.

The patient should be placed on a seat lower than the surgeon; (in the field a hospital pannier is the best) and so supported that he may not be able to slide off during the operation, the assistant in charge of the tour-

* General Scott of the United States army, happily recovered from such a wound and has a very useful arm.

niquet, or instrument described,* standing behind, and regulating the support in such manner that he may always be able to make steady compression when required. The shattered arm or stump is then to be raised from the body, sufficiently to enable the hand of the operator to examine the axilla, and ascertain that his assistant can compress the artery when he pleases; for this simple motion of raising the arm to near a right angle with the body, to afford access to the axilla after the pressure is made, will frequently render some alteration of it necessary. The arm should be also raised, so as to point out more clearly the insertion of the pectoralis major, and the posterior fold of the arm-pit; and as being more convenient to the operator, who, placing his finger on the lower end of the acromion process in the centre of the shoulder, (the hair in the axilla having been previously removed) with the smaller amputating knife commences his incision immediately below it, and with a gentle curve carries it downwards and inwards through the integuments only, a little below the anterior fold of the arm-pit, and which the raising of the arm readily points out. The second incision outwards, is made after the same manner, but something lower down, and is continued underneath, so as to shew the long head of the triceps at the under edge of the deltoid, without dividing any of the muscular fibres; by which means the skin has time and freedom to retract, which is a great object, being the part in general most wanted, and when retracted allows of subsequent extension. The third incision commencing at the same spot as the first, but following the margin of the retracted skin, divides the deltoid on that side to the bone, and exposes the insertion of the pectoralis major, which must be perfectly cut through, to shew the short head of the biceps

* The handle of the common tourniquet covered with a linen bolster, is to be pressed by an assistant on the subclavian artery where it crosses the first rib

flexor cubiti, and the coraco brachialis, which are then readily known by their longitudinal fibres, and the freedom the arm or stump receives from losing its attachment to the fore part of the chest: these two muscles however are not to be touched, although the flap thus formed is to be separated, and raised so as to expose the head of the bone, nearly as far as the coracoid process of the scapula. The fourth incision outwards, in the same manner divides the deltoid muscle down to the bone, and extending to the long head of the triceps, which it is not necessary to touch, as it would be afterwards divided: this flap is to be well turned back, so as to shew the insertions of the teres minor and infra spinatus, coming across horizontally from the scapula, to be inserted into the great tuberosity of the humerus; the posterior circumflex artery will be divided close to the bone, the anterior circumflex, and the continuation of the thoracica humeriana on the integuments of the arm, and some other small vessels may bleed, if the compression be not correctly applied; they ought not however to be tied, but merely stopped with the finger, and particularly the posterior circumflex, as this must again be divided, and pressure on the subclavian readily commands it; both the outer and inner flap being now raised, the head of the bone may be rolled a little outwards, and the teres minor and infra spinatus cut across upon it with a large scalpel, opening at the same time into the cavity of the joint; by which means the error of slitting up the bursa under the acromion, instead of the capsular ligament, will be avoided, and continuing the incision upwards, cutting through the capsular ligament, the tendon of the supra spinatus, and the long head of the biceps flexor cubiti as close as possible to the edge of the glenoid cavity. The surgeon placing his fingers on the head of the bone, cuts through the inner side of the capsular ligament, and with it the sub-

scapularis muscle, going to be inserted into the lesser tuberosity of the humerus. The edge of the knife being constantly towards the bone, he divides the under part of the ligament, separating the head of the bone from the glenoid cavity : resuming the small amputating knife, he cuts through the long head of the triceps, to prevent its hanging too much into the wound, and then with one sweep he connects the points of the two first incisions underneath, separating the arm from the body, dividing again the circumflex arteries above the first incision, the teres major, latissimus dorsi, coraco brachialis, long head of the triceps, axillary artery, veins, and nerves. This being the only dangerous step of the operation, the surgeon should inform himself if the artery be sufficiently compressed, which he will know by the posterior circumflex artery not bleeding, and the want of pulsation in the axilla : he should caution the assistant to preserve the steady position of the patient, and have another ready to press his closed hand upon the artery, if it should bleed. Laying down the knife, he takes the artery if bleeding between the finger and thumb ; or if compressed pulls it out with a tenaculum, and ties it firmly with a small ligature of two good threads. The vessel is found contracted amongst the nerves in the lower third of the wound ; all pressure being removed, the anterior and posterior circumflex arteries will bleed, and must be secured ; or, if the artery subdivides high up, there may be a fourth large branch.

In recent cases of injury I have seldom had occasion to take up more than three arteries, and no cutaneous or other vessels, besides those divided by the last incision. The nerves, if hanging in the wound must be shortened, which though painful, prevents a source of irritation hereafter from their adhering in the neighbourhood of the cicatrix. The axillary vein, if it continue to bleed, should be secured with a single thread, as it

allows some blood to pass into the wound after it has been brought together, and, what is of more material consequence, permits it to pass into the loose cellular membrane surrounding the vessels down to the clavicle, which may cause considerable mischief, as the position of the patient is favourable to its gravitation.

All compression having been taken off the artery, the wound should be well cleansed, and here a little delay may be allowed. If the tendon of the long head of the biceps flexor cubiti be left long, it ought to be cut off with the scissors, as well as any ragged portions of the capsular ligament. The glenoid cavity need not be deprived of its cartilage. The pectoralis major will be observed to have retracted considerably, and to have doubled or folded in the skin covering it; through this (the parts being brought together,) a suture should be put to the opposite side, and the whole properly supported and compressed by strips of adhesive plaster and bandage, the ligatures being brought out direct. The incision then forms but one line from the acromion downwards, curving at the bottom to the fore part of the chest, the skin at the axilla being always a little wrinkled, and much inclined to retract. The flaps of the deltoid meet firmly, sink a little into the hollow under the acromion, lie close upon the glenoid cavity and the coracoid process; and from the pressure of the adhesive plaster and compress, with the evenness of the wound, the skin of this part nearly unites by the first intention; the hollow round the glenoid cavity is comparatively small to what might be expected, and the consolidation in healthy subjects, where every thing has done well, goes on steadily, so as not to leave any cause of future inconvenience. The surgeon, in all his dressings, should take care that no collection forms any where by keeping up a regular and proper compression in the course of the artery, the coracoid process, the pectoralis major,

and the muscles from the scapula and back. The pain and sensation principally complained of is from the hand and arm ; there is seldom any hæmorrhage, and the patient does not suffer more than in any other common amputation.

I have insisted on the arm being raised from the first, because in all operations that require the principal artery to be compressed, it should not be done until the limb be placed in the situation in which the operation is intended to be performed, as the mere alteration of posture removes the pressure from its destined point, as must frequently have been observed, when the tourniquet is applied without this caution in the axilla, or thigh. This elevation also allows more freedom to the knife in every direction, and points out more clearly the situation of parts. I beg, however, to be understood as not recommending the arm to be raised in secondary cases, when there is partial anchylosis, or thickening of the ligaments, or other fair obstacles to its being done with ease to the patient.

It is not necessary to lay bare the acromion, on the contrary, the finger should be placed immediately upon it, to insure the first incision, being near half an inch below it, if the eye of the operator be not a sufficient guide ; the flaps turn aside sufficiently without it, the head of the humerus is extricated with equal ease, and there is no subsequent danger if the stump should slough, or of the acromion coming through and being a future inconvenience to the patient.

In making the last incision of separation, care should be taken to save as much of the integuments as the nature of the operation will permit ; and this is done by keeping the head of the bone as far from the glenoid cavity as the attachment of the teres major and latissimus dorsi will allow, and by then cutting as close to the bone as possible. The long head of the triceps muscle

is divided before the last incision, to prevent its hanging too long in the wound, and interfering with the approximation of the integuments. The anterior and posterior circumflex arteries require only a single thread ; the latter will be divided about three quarters of an inch from its origin, and the axillary artery in general near an inch, from where it gives off the subscapularis.

From Mr. Guthrie's statements it appears that the amputation at the shoulder, succeeds vastly better when performed on the field of battle, than when the patients are taken into hospitals. Of nineteen cases in which the operation was performed, soon after the wounds were received, *one* only died.—Whereas of an equal number of operations performed in the general hospitals, *fifteen* died, a strong argument in favour of promptness in all such cases.

I have once been called to perform this operation in a case of fungus hæmatodes near the shoulder, and shall describe my mode of operating, which is that taught by Dr. Physick.—An assistant was charged to compress the subclavian artery, where it crosses the first rib—an incision was then made with a large scalpel, from the anterior to the posterior edge of the axilla, in a direction somewhat curved downwards—this incision was only through the skin and cellular texture, which were dissected upwards from the deltoid muscle—another incision was next made in a straight line through the skin of the axilla, meeting the first—the joint was now cut into through the top of the deltoid—the head of the humerus luxated, and the amputation completed by passing the knife through the vessels, nerves, and other soft parts in the axilla—the axillary artery was evident at first glance, but did not bleed ; it was secured by a strong ligature, as were all the other bleeding vessels. The whole operation was over in eleven minutes, and a very small portion of that time was consumed in the

incisions. The flap was now brought down, and the edges of the skin were found to approximate very well—a better flap could not have been formed in any other way.* It healed up very readily and my patient got well.

From what I have seen and read on this subject, I cannot hesitate to believe that in a great variety of ways, the arm may be safely amputated at the shoulder—the plan I selected was of course that which struck me as best adapted to the particular case.

I have no doubt that the operation has often been performed without necessity. I have once amputated an arm torn off by a cannon shot, as high up as the axilla, I preserved a flap by retaining the integuments in such parts as appeared sound, and sawed through the bone in the usual manner, in this case the axillary artery was the only one which required a ligature. This case would in the opinion of many have warranted amputation at the joint, but it would have added much to the danger, pain, and confinement of my patient.

That the operation becomes in some cases absolutely necessary I well know, and in such cases it should be performed in the manner recommended by Mr. Cline.

With respect to the dressings, all that can be said is, that after the arteries are tied up, the flap is to be neatly applied over the joint, and kept in its proper position by adhesive plasters and a roller.

* It would be as easy to include the deltoid in the flap, but this would be soon absorbed, and without being useful, would render the operation more difficult from the blood vessels which would be cut, but in most instances the surgeon has no choice, and is compelled to make his flap, (if indeed he can effect it at all) wherever there may be flesh enough left to afford him one.

CHAPTER XXXIX.

Amputation at the Hip-joint.

THE dangers attending this tremendous operation have almost occasioned it to be laid aside. Mr. Pott declared, after having seen it done, that he should never perform it on the living body.

A French surgeon by the name of Barbet, received a prize from the Academy of Surgery, for an essay on the present subject in 1759. He considered it a necessary operation in three distinct cases. 1st, When the soft parts around the joint have mortified. 2dly, When a cannon ball has shattered the limb, in such a manner as to leave but a small portion of flesh to unite it with the trunk ; and 3dly, In cases where the femoral artery has been wounded near Poupart's ligament.

The two first cases are happily rare, and yet they certainly sometimes sanction and demand the operation. The third case is now treated in a very different manner, by tying the artery above the wound. Certain other diseases near the articulation may perhaps render the operation necessary.

Messrs. Pariset and Petit have written a short paper on this subject in the *Dictionaire des Sciences Medicales*, in which they declare that the operation has been successfully performed by two French surgeons, Lacroix and Perault.

Dr. Larrey has performed this operation oftener than perhaps any other surgeon ever did ; his patients have in most instances died, but I am informed that in three ca-

ses they recovered. It ought only to be performed when certain death is the alternative.

It is evident that the circumstances demanding this operation must materially influence the mode of performing it. The separation of the injured parts must be effected in the simplest possible manner, and the blood-vessels carefully secured. Larrey in performing the operation commences by tying the femoral artery as near as possible to the crural arch; he then forms a flap on the inside—cuts down to the articulation—divides the capsular and round ligaments—dislocates the bone—forms an external flap of the glutæi muscles adapted to meet the internal flap—after which the arteries are tied up, and the parts brought together and dressed in the usual manner.

As some of the principal vessels wounded in this operation are the branches of the internal iliac, it appears to me that in emaciated subjects it would be easy, for a time, to command the hemorrhage by compressing the aorta opposite the navel, and in most patients I believe this would diminish the loss of blood.

The following remarks, taken chiefly from Mr. Guthrie's treatise on gun-shot wounds requiring amputation, will convey to the reader the latest information on the present subject. The military surgeons are almost exclusively those who are called on to perform this operation, and they have of late years, had several opportunities of testing its value.

“I have not much to offer from actual experience of the operation, having performed it but once unsuccessfully. I have however seen many cases in which it ought to have been attempted, and which died. I have seen many in which the operation would have been necessary, if the constitution of the patients could ever have recovered the shock it had received at the moment of injury. I know that many cases have died after long con-

tinued disease of the thigh bone from gun-shot wounds, that would have had a chance of recovery, if the operation had been performed; and I have several times amputated so close to the trochanters, that I could with ease have removed the head of the bone without any increase of the external incisions.

This amputation is of course either primary or secondary; but the nature of the injury or disease differs very much in these two stages; for very few, or none of the cases that render its performance necessary on the field of battle, ever live to the period when secondary amputation is usually recommended.

Wounds demanding amputation of the hip joint on the field of battle, arise from cannon or grape shot, or the explosion of shells. Few surgeons would think of performing it for a wound by a musket ball, although cases may occur that require it, and the principal one that will render it necessary, will be a fracture of the head or neck of the bone, with a wound of the great vessels, or some other arterial trunk causing hæmorrhage, and stuffing the thigh with blood. A grape or small cannon shot, may strike the fore part of the thigh, and without wounding the inguinal artery itself, may, in its passage to the neck of the femur, wound some large arterial branches, causing considerable hæmorrhage: the wound shall not be large, and yet the chance of saving the life of the patient will be but very small indeed. I recollect two cases of this kind in particular; one after the battle of Vimiera, by a cannon shot, which proved fatal on the second day after the injury, no one at that time thinking of the amputation at the hip joint. The other occurred at Salamanca, by a large ball, which shattered the neck of the femur and the body of the bone below. I did not see this person for near forty-eight hours after the injury, but was informed that on his first presentation for assistance, an artery, supposed to be a

large branch of the femoral, had thrown out its blood per saltum, and was stopped by pressing some lint on the wound. The limb soon swelled to nearly twice its natural size, with much external inflammation. The patient himself thought his case desperate, as did every one about him, and declared his willingness to submit to any operation that might be proposed; but the time for operating was past, even if any operation could have been agreed upon.

After two months of severe suffering, in which there were even some prospects of life being preserved, this man died. The latter period of the time was passed, however, without any hope of recovery, and surgical aid was given merely with the view of rendering his last moments as easy as possible. The great strength of constitution shewed by this man during the whole course of his illness, and his great endurance of suffering, have always inclined me to think the operation at the hip joint would have succeeded, if it had been performed shortly after the receipt of the injury.

A shell bursting near a soldier may drive a large piece of an inch in thickness, and a pound or two in weight, into the inner part of the thigh, without wounding the femoral artery, yet fracturing the head of the bone: here several large vessels, and perhaps the great sciatic nerve would be divided, and the only chance of life, in my mind, would be in the immediate removal of the whole. I saw a fatal case of this kind during the siege of Ciudad Rodrigo, where the patient lived long enough to shew the necessity of performing this operation.

A piece of a shell may strike between the trochanter and the ilium, go through the neck of the bone, and tear its way out below the tuberosity of the ischium, destroying all the parts in its course, without either killing the soldier by hæmorrhage, or by the shock of the blow to the constitution. This accident happened to a man of

the 40th Regiment, at the battle of Salamanca, about four o'clock in the afternoon. He was in a good state to undergo the operation when I saw him next morning, but none of the surgeons present with me would agree to it; all allowed nothing could save the man; but the opinion entertained of the cruelty of the operation, and of its certain failure prevented its being done. I took this man into Salamanca with me, and his appearance for six successive days before he died, made me reproach myself for my want of courage, in not contemning any remarks that might be made, on my having undertaken it in opposition to the opinion of my colleagues; and I declined it, not because the general opinion was against it, but in consequence of the bad success of one, and of the good success of the other, of the two next cases to be related.

When a cannon-shot carries away the thigh above its middle, so as to exclude the more common flap operation close to the trochanter, it is almost always fatal. These accidents generally destroy at once. On the field of battle, I have seen many, having searched particularly for them, but have found them dead, or beyond the reach of surgical aid.

I have seen a case of a cannon-shot striking the outside of the thigh, tearing away the trochanter and surrounding parts, without wounding the femoral artery, or any great vessel that would cause any serious hæmorrhage, or so great a shock to the constitution as to render the operation impracticable; yet this man died without any attempt being made for his relief, which was neither good surgery nor humanity.

When the femoral artery has been torn through by a cannon-shot there is, at the moment, a great loss of blood, but the patient does not bleed to death, neither does he appear to die ultimately from the effects of the hæmorrhage; for I have seen several men lose a greater

quantity from the same vessel without any such effect, but from the shock to the constitution ; and this observable in many cases of amputation of the thigh, where there has been little loss of blood ; and yet the patient dies, during, or immediately after the operation. A considerable hæmorrhage, on the other hand, renders a patient less able to bear an operation than he otherwise would do, and where there has been much and sudden bleeding, the powers of life are so exhausted as not to be able to bear any further disturbance. This effect is most frequently caused by wounds of the femoral artery, and where it has occurred, the chance of success from the operation, will be very small : and the combination of injury arising from the loss of blood, and the shock of the blow, will have so much diminished the powers of life, that the operation in addition, will destroy the remainder.

If (as I have seen in many instances) the bones of the pelvis are injured, in any of the preceding kinds of accident, the result will be fatal, and the operation should not be performed ; but some little destruction of the soft parts, should not prevent it, if the patient be otherwise in a favourable state.

A very extensive injury of the soft parts of the thigh, if the bone be not broken, and the femoral artery not divided, does not authorize the operation, although the artery be laid bare for three or four inches of its course.

An officer of the 88th Regiment, was wounded in the trenches, at the siege of Ciudad Rodrigo, by a twenty-four pound shot, which struck the outside of the anterior part of the left thigh, and carried away the fore part of it from the groin to within a hand's breadth of the knee ; the femoral artery lay bare at the bottom of the upper part of the wound, and was seen pulsating for near three inches ; the sartorius and rectus muscles were carried away, and all the muscles on the outer and

inner side of the thigh more or less mangled by the shot, or torn by the laceration; it was altogether the most frightful looking wound I had seen, not even excepting where the limb has been completely torn off. Having the superintendence of the 3d and 4th divisions of infantry, the greater part of the medical officers of both were with me at the time; and on this officer's being brought to our field hospital in the rear of the trenches, they all, without an exception, declared he must shortly die, if the limb was not removed. In compliance with this opinion, I proposed to tie the artery below Poupart's ligament, and to endeavour to save flaps to cover the great trochanter, the bone being sawed off below, as I have since done in several instances; and if this was not practicable, the head of the femur was to be removed. On placing him on the panniers for the purpose of operating, he was so exceedingly faint, the pulse at the wrist being scarcely perceptible, that I conceived the operation would be useless, as he would certainly die under our hands. He was removed to a corner of the hospital, and placed on a hay mat amongst other cases of wounded supposed in a dying state, a little lint being laid over this enormous surface. By the next morning he had much recovered, and as his thigh became very painful, he was desired by the surgeon of the division arriving in succession, to wet it with warm water; this was done, but his countenance was so ghastly that he was considered by every one as dying: indeed his regiment actually returned him dead, and his commission was filled up in England. In this state he remained till the day after the storming of Ciudad Rodrigo, when, from the advance of Marshal Marmont, the wounded were sent across the Agueda. Desirous of knowing whether any stragglers of the corps I belonged to might still be at the field hospital, I rode to it on leaving the town, and found every one gone except this

poor gentleman, who requested my assistance ; having conveyance in the town, I offered to take him to my divisional hospital, five leagues distant, where all the other wounded had been conveyed, which offer he gladly accepted, and reached the village of Aldea del Obispo, with less inconvenience than I expected ; I daily feared the femoral artery would give way, but nothing of the kind occurred, the slough from the whole surface of the wound soon separated, and there was much less of it than is usual on such occasions, but this may be attributed in some measure to the attention paid him, and to the extreme coldness of the weather in a room without a fire-place. The discharge of pus was very great, and the artery lay in a channel completely covered by it ;—I hourly expected it would ulcerate, but granulations soon began to shoot out, and by the end of three weeks the artery was covered in, although its pulsations were still visible at a distance ; the sore gradually contracted in a surprising degree, and in two months it was diminished to half its original size, very little new skin having been formed. At this period he left me on his way to the rear, on the army moving down to the siege of Badajos. The attention paid to this officer in regard to diet, attendance, and surgical aid, was very great ; more, indeed, than he could have received under any other circumstances. His recovery was considered so unlikely, that no one looked at his wound after the first day ; all supposed him past relief, as was really the case with an officer of Engineers, lying beside him, whose arm was shattered to pieces by a shell, and the os ilium bared on the outside of the glutæi muscles, and on the inside of the iliacus internus, as if it had been for some time in maceration. The insertions of the external and internal oblique, and the transversalis muscles were torn out without the peritoneum being opened, which alone prevented the intestines from coming out at the wound.

Although this gentleman's life was saved, still, I am of opinion, that very few would have recovered under the same injury.

The secondary operation has seldom, I believe, been performed during the high suppurative stage succeeding to injury from gun-shot wounds; and as I do not believe it can be successful, if done at this period, I would not perform it after the second day, until the third or fourth week. There are not many cases that will demand it at this period, as the femur, in most compound fractures of the thigh, can in general be sawed off, at, or immediately below the little trochanter."

The operation has been twice performed in England: in one case it was completely successful; and in the other, the patient lived thirty days.

"Mr. Brownrigg, Surgeon to the Forces, has performed the operation four or five times: on one occasion the patient lived eight days, and died from fever, supposed to arise from causes foreign to the operation.

In the last case he was completely successful. The man received a gun-shot wound in the thigh, which fractured the bone close to the trochanter, on the 29th Dec. 1811, near Merida, in Spain. On the 12th of December, 1812, the operation was performed, and the man is now living at Spalding, in Lincolnshire, in perfect health.

Mr. Brownrigg intends, I believe, to publish the particulars of this case. I have also been informed, that the operation has been performed in the West Indies.

These cases prove, that the operation is not only necessary, but practicable, and that it may be effected with success under certain circumstances. This being granted, it necessarily follows that the operation ought to be recommended and performed in every case in which it can alone bring relief, or offer a prospect of success. No man should, therefore, be allowed to die without its

being proposed to him; and if it be a case for primary operation, the sooner it is done on the field of battle, consistent with propriety, the greater will be the chance of success, for the patient cannot live to the period for secondary amputation. It is in this, and other operations high in the thigh, that the question of time is most important, for haste is as injurious as delay, when improperly applied.

If the patient has suffered much loss of blood, or is in a state of syncope, or nearly approaching to it, unable to articulate, with a pulse scarcely perceptible, and the skin clammy and cold, an immediate operation would only hasten his death; but if excited by stimulants and cordials, he will have some chance of recovering himself in an hour or two, so as to undergo the operation with a better prospect of success, or he will in that period sink and die. If, on the contrary, he is brought to the surgeon, although much alarmed and reduced by the sudden shock and loss of blood, with strong sensations of pain, expressed by his cries for assistance, convulsive motions of the limb and body, and the powers of the sensorium not destroyed, the operation should be performed immediately; or, instead of becoming more calm and collected, he will gradually sink into the state of the first described, and be unable to bear the operation. On the other hand, the first mentioned, if he be excitable, will in time rather approach to the state of the latter, and from the pain, &c. he suffers, will call for the performance of the operation. This violent nervous commotion, however, is not common; it depends upon particular idiosyncrasies, and will never in the first be so excessive as in the last.

The operations being decided upon, it is, I confess, not like that at the shoulder-joint, to be done by every one of moderate ability. No surgeon should attempt it, unless he is conscious of possessing great coolness, a

presence of mind equal to any emergency, and a correct knowledge of the parts to be divided.

I consider the operation to be best performed in the following manner. The patient should be laid on a low table, or two field panniers placed together, covered with a folded blanket to prevent the edges giving pain, and properly supported in a horizontal position. An assistant leaning over, and standing on the outside, should compress the artery against the brim of the pelvis, with a firm, hard compress of linen; such as is usually used before the tourniquet; he should also be able to do it with his thumb, behind the compress, if it be found insufficient. The surgeon standing on the inside, with a strong pointed amputating knife of a middle size, with the back curved, makes his first incision through the skin, cellular membrane, and fascia, so as to mark out the flaps on each side, commencing about four finger's breadth, and in a direct line below the anterior superior spinous process of the ileum in a well-sized man; and continuing it round in a slanting direction at an almost equal distance from the tuberosity of the ischium, nearly opposite to the place where the incision commenced. Bringing the knife to the outside of the thigh, he connects the point of the incision where he left off with the place of commencement, by a gently curved line, by which means the outer incision is not in extent more than one third of the size of the internal one. The integuments having retracted, the glutæus maximus is to be cut from its insertion in the linea aspera, and the tendons of the glutæus medius and minimus from the top of the trochanter major. The surgeon now placing the flat edge of the knife on the line of the retracted muscles of the first incision, cuts steadily through the whole of the muscles, blood-vessels, &c. on the inside of the thigh. The artery and vein, or two arteries and vein, if the profunda is given off high up, are to be taken be-

tween the fingers and thumb of the left hand, until the surgeon can draw each vessel out with the tenaculum, and place a ligature upon it. Whilst this is doing, the assistants should press with their fingers on any small vessels that bleed. The surgeon then cuts through the small muscles running to be inserted between the trochanters, and those on the under part of the thigh, not yet divided: and with a large scalpel opens into the capsular ligament, the bone being strongly moved outwards, by which its round head puts the ligament on the stretch. Having extensively divided it on the fore and inside, the ligamentum teres comes into view, and may readily be cut through. The head of the bone is now easily dislocated, and two or three strokes of the knife separates any attachment the thigh may still have to the pelvis. The vessels are now carefully to be secured. The capsular ligament, and as much of the ligamentous edge of the acetabulum may be removed as can readily be taken away. The nerves, if long, are to be cut short, the wound well sponged with cold water, and the integuments brought together in a line from the spinous process of the ilium, to the tuberosity of the ischium. Three sutures will in general be required, in addition to the straps of adhesive plaster, to keep the parts together; the ligatures are to be brought out in a direct line between the sutures, a little lint and compresses are to be placed over the wound, and on the under flap, to keep it in contact with the cotyloid cavity, and assist the union of the parts. A piece of fine linen is to be laid over them, and the whole retained by a calico bandage put round the waist, and brought over the stump.

It is recommended to pare the bone of its cartilage; and if this could be readily done, I would willingly agree to it, but the cartilaginous surface of the acetabulum is not to be cut away without much difficulty and

some time, which cannot be spared : for I consider the success of the operation to depend very much upon the quickness with which it is performed, not on account of hæmorrhage, but to avoid the shock the constitution receives from the continued exposure and irritation of so large a surface in the immediate vicinity of the trunk of the body. It is proved by experience to be unnecessary at the shoulder joint ; and will, I think, be found equally so at the hip joint.

When I wrote these observations, and shewed the method of performing the operation in the Peninsula, I thought I was the first to recommend that the artery should not be tied previous to commencing the operation. M. Baffos, however, has the priority in practising it, which I readily grant to him, and am gratified in having his authority to adduce in support of the measure.

Union by the first intention is to be wished for in a great degree, as lessening the surface of the wound ; but as all the parts beneath the skin cannot unite, and especially about the acetabulum and the inside of the glutæus muscle, it is not advisable to let the skin adhere on the middle and lower part of the stump ; for as the parts deep-seated must suppurate and granulate, a fair opening for the discharge should be preserved, and collections of matter in any part should be carefully guarded against by gentle pressure, compress, and bandage.

The after treatment will be the same as in other cases of amputation : the shock, however, of the injury and the amputation will be so great, that the antiphlogistic regimen to the extent of blood-letting will not be necessary. If the patient be very low, cordials in small quantities, with opiates, should be given, and a light nourishing diet. If inflammatory symptoms come on, the appropriate remedies formerly recommended must be employed without delay. If there be heat or un-

easiness in the wound, it must be kept wet with cold water.

If the surgeon called upon to perform this operation, has not been in the habit of dealing with large arteries, he may feel an unconquerable repugnance to cutting through the femoral artery before it has been tied; and although I can most positively assure these gentlemen, there is nothing to fear in doing it, still they may tie the artery first, if they cannot overcome this feeling of danger. It is to be done by cutting through the integuments in the usual manner, and then dissecting for the artery and vein, previous to cutting through the muscles."

CHAPTER XL.

Amputation of the Fingers and Toes.

THE fingers and toes are generally removed at the joints. The operation is very simple when the structure of the joint is known. The skin should be moderately drawn back, and a circular incision made through it a little beyond the joint. A portion of skin is next detached with the scalpel sufficient to cover the stump. This little flap being reflected, the tendons and soft parts are to be cut down to the joint. The joint is now bent and the capsular ligament divided posteriorly, after which one of the lateral ligaments is to be cut through; the bones now easily separate and the scalpel can be passed between to complete the division of the connecting parts. After this is done the flap is brought forward, its edges neatly approximated, and secured by a strap of adhesive plaster, after which a narrow roller is to be bound round the stump. The bleeding generally ceases after the dressings are applied, but if not it is easy to take up the vessels. A new mode of amputating fingers is described by Mr. Charles Bell, but it is less simple and no better than the one I have mentioned.

The removal of the metatarsal and metacarpal bones in an operation described by many writers, but one which is rarely necessary. I believe it will be found easier in most cases to cut down to the diseased bone, and remove with a trephine or saw resembling Mr. Hey's the affected part.

CHAPTER XLI.

Of Hemorrhage after Amputation.

It not unfrequently happens that a discharge of blood takes place from the stump after amputation. It is consequently of importance to leave a careful assistant with the patient, and a loose tourniquet applied on the limb.

The most frequent cause of secondary hemorrhage is the omission to tie up some artery which did not bleed immediately after the operation, owing to the languor of circulation, and the coldness of the stump from exposure which occasions a temporary contraction of the vessels; the heat being restored and the circulation excited these vessels pour out blood. To obviate this inconvenience it is right to give the patient wine and water before the dressings are applied, and to wait a short time in order to ascertain whether the vessels will bleed.

Another cause of bleeding after amputation is an improper degree of tightness in the circular bandage, which intercepts the return of blood through the cutaneous veins. Of course in cases of secondary hemorrhage a careful attention should be paid to the bandage surrounding the limb.

Bleeding sometimes takes place from the medullary artery passing through a bone. I once saw a very troublesome hemorrhage of this sort, which was finally arrested by the introduction of a small cedar plug into the bony canal which afforded a passage to the vessel.

Sometimes the bleeding results from the slipping off a ligature which had been carelessly tied. This event

should be guarded against by great care in securing every considerable vessel with a double knot.

The bleeding sometimes also depends on a morbid condition of the system which is incompetent to those functions necessary for the restoration of the wounded parts. In this case the flap and stump will not reunite, and the arteries like the other parts will refuse to heal. This is only to be prevented by general remedies adapted to the constitution.

In many cases the bleeding from a stump is so trifling as to give no serious alarm, but there are cases in which the loss of even a small quantity of blood is dangerous, and others in which so much is lost as to occasion great uneasiness. In these cases moderate pressure constantly continued by the hands of assistants may be tried, and in some instances this method prevents the unpleasant necessity of removing the dressings and exposing the stump. If it be not however successful the bleeding vessels must be carefully sought for, and secured by ligatures.

There is another kind of secondary hemorrhage which results from ulceration of the larger arteries; this may occur at a remote period from the operation, sometimes a month has previously elapsed. It is, however, extremely rare, and admits of no remedy but cutting down to the vessel and tying it up, or if this cannot be done, the trunk from which it proceeds should be tied.

Mr. Hey has performed a singular operation with a view to arrest the secondary hemorrhage, and he says with success. I shall state his observations. "I have seen a few instances of the integuments becoming so contracted after the operation as to compress the veins just above the extremity of the stump, and bring on after some hours copious hemorrhage. When it has appeared clear to me that the hemorrhage was venous I have made a division of the integuments on one side of the thigh

sufficient to remove the stricture, and this method has immediately suppressed the hemorrhage." I have myself never seen such a case and therefore offer no opinion on the propriety of the practice. I shall subjoin from Mr. Hey a few more observations on the present subject.

"When we are under the necessity of amputating a limb that has suffered great contusion, though the operation is performed upon a part apparently sound, the wound sometimes becomes sloughy, and ill-conditioned. No good granulations arise to cover the extremities of the arteries, but the ligatures cut through these vessels, or becoming loose, cease to make a sufficient pressure upon them, and hence repeated hemorrhages ensue. This is a dangerous state for a patient; for if the vessels are taken up afresh with the needle, the hemorrhage will now and then return in the course of two or three days. In such cases the application of dry sponge, cut transversely, as directed by Mr. White,* has been found singularly useful, and has saved the life of the patient. But a constant pressure must be kept upon the pieces of sponge, by the fingers of a succession of assistants, till granulations begin to arise upon the stump, and the prospect of future hemorrhage disappear. This method is of the greatest importance after amputation on the thigh or leg, where the great vessels are deeply seated. In the arm, above the elbow, where the vessels are more superficial, the great artery may be taken up, with a portion of muscular flesh, above the surface of the stump, by making first an incision through the integuments. My colleague Mr. Logan has done this twice within the last year, with complete success, when repeated ligatures, applied in the usual way, had failed.

"In the morbid sloughy state of the stump above-mentioned, the application of lint soaked in a liquid, com-

* See Cases in Surgery, by Charles White, F. R. S.

posed of equal quantities of lemon juice and rectified spirit of wine, has been found very advantageous, and has caused the stump to put on soon a healthy aspect."

It is recommended to apply cold lotions in those cases in which the hemorrhage appears to proceed from one or more small vessels; cloths wet with a solution of sugar of lead may be placed upon the dressings and renewed from time to time as they become warm.

The use of styptics and astringents can never be applied with propriety to the surface of a stump. The agaric formerly employed, is never used at the present day. Mr. Petit contrived an instrument for the purpose of compressing the whole surface of a stump after amputation. To prove the importance of his invention, he relates a case in which a thigh was amputated, and the femoral artery was found ossified, and could not be secured by a ligature; his complicated machinery was applied and arrested the hemorrhage; this contrivance, however, has sunk into deserved neglect, and no confidence should be placed in any similar machine.

Upon the whole, the best mode of preventing trouble from hemorrhage after amputation, is to secure carefully every bleeding vessel by a ligature.

CHAPTER XLII.

Of Spasms of the Stump.

It often happens that spasmodic motions in the muscles of the stump take place after amputation, which are attended with extreme pain. They sometimes continue for several days, and now and then affect the whole body : in some instances death has resulted.

The present modes of operating are supposed to have diminished the frequency of these unpleasant consequences, but they still occasionally happened. The best mode of relieving the pain and of preventing injury to the stump, is to have it held by a succession of assistants, and to administer liberal doses of opium.

In cases in which amputation is performed on persons addicted to habits of intemperance, the administration of opium is always proper to prevent the occurrence not only of spasm, but of delirium, and death ; this remark however is equally applicable to all surgical operations under similar circumstances. Volatile alkali and other stimulating articles are also useful medicines in these instances.

CHAPTER XLIII.

Extirpation of Tumours.

ONE of the most eloquent compositions contained in our medical libraries is the treatise upon tumours contained in Mr. John Bell's Principles of Surgery; having very freely censured this writer in a former chapter, I take great pleasure in applauding where I have so fair an opportunity. To his treatise therefore I refer my readers for a most elaborate and instructive history of our present subject. The limits allotted to this work prevent me from entering extensively into it, and I shall in general terms advise the early removal of all tumours which constantly increase in growth—which after being indolent become painful—or which are situated in parts where their enlargement or ulceration would occasion an interruption to any of the functions of the body.

ENCYSTED TUMOURS which in popular language are called wens, ought to be cut out, for although they have no tendency to end in cancer and do not often ulcerate, yet they encrease occasionally to an enormous size. They consist of an external bag or sac, containing either fat, in which case the tumour is called *steatomatous*, or a substance resembling honey termed *meliceris*, or a soft pappy substance called *atheroma*. Commonly these wens are not deeply seated and are moveable, in which case they are very easily taken out. The operation consists in making an incision through the skin down to the tumour, and dissecting round it, carefully avoiding an opening into the sac. The method of dissecting out a

cancerous breast, is applicable to most encysted tumours. The skin to be saved must be sufficient to cover the wound, but it is inconvenient to leave more and therefore where the tumour is large, two incisions are to be made meeting like two segments of a circle, or the marks of a parenthesis ().

FLESHY OR SARCOMATOUS TUMOURS have been the subject of a very valuable essay by Mr. Abernethy. He divides them into a number of classes which I shall not enumerate, because the knife is the safest and least painful remedy for them all.

Great improvements in surgery have resulted from the boldness with which large arteries are tied up, among others, the extirpation of tumours is greatly facilitated by securing those vessels which may be liable to injury, before the operation, Mr. Goodlad, secured for example, the carotid, previously to cutting a tumour from the face. It is often sufficient however, to expose the vessel so as to place it under the command of an assistant.

The surgeon should prefer the early extirpation of tumours, but he is not to be deterred by their future growth from dissecting them out. A very large tumour was safely and successfully removed from a man's neck and face by Dr. Physick in the Pennsylvania Hospital. The weight of this tumour was seven pounds, its circumference twenty-three inches at its base, and twenty-five and a half inches at its largest part. It involved the parotid duct which was divided in the operation. The patient soon recovered, and was discharged cured. Previously to the operation he appeared like a man with two heads.

In order to prove that the size of a tumour furnishes no objection to its removal, I shall insert a case, from the American Philosophical Transactions. I believe it to have been the largest steatomatous tumour ever successfully removed from the human body. A French





surgeon Mr. Dela Croix, extirpated a diseased testicle weighing 29 pounds, but this was an entirely different operation.

CASE.

The patient, Julia Richards, a negro woman, from Carlisle, in Pennsylvania, was aged about forty-five years, and enjoyed good health; she was corpulent, but active, until her exertions were restrained by the incumbrance of her tumour.

She stated that it had been first noticed about eighteen years before I saw her;—that it had grown gradually, and had never been painful. When she applied to me, her attitude in walking resembled that of a woman carrying a large and heavy sack. On examination, I found the tumour arising at the upper part of the back, extending equally on both sides, and although pendulous from its weight, yet the root of it was very large. The dimensions were as follow:

Circumference at the neck or narrowest part of the tumour, two feet ten inches.

Circumference at the thickest part, vertically, three feet nine inches.

Circumference horizontally, three feet one inch and a half.

The circumference of the waist after the wen was removed, was two feet nine and a half inches, so that the narrowest part of the tumour was thicker than the patient's body.

The surface of the tumour was tolerably regular, but very large and numerous veins were seen in various parts of it.

The patient was admitted into the Pennsylvania Hospital, and on the 22d of February, 1815, I proceeded

to remove the tumour. Having previously administered an opiate, I placed her (at the suggestion of Dr. Physick,) on her face upon the table, fifteen minutes before commencing the operation, and directed assistants to elevate the tumour in such a manner as to empty it as completely as possible of blood, and I was greatly delighted to perceive the change in the size of the superficial veins, which resulted from this simple expedient, many of them contracted and could not be perceived.

The operation was commenced by external incisions calculated to preserve skin enough to cover the surface left by the removal of the tumour, and this skin being dissected and turned back, which was the most tedious part of the operation, the tumour by large and rapid incisions, was detached from its base and removed. It adhered to some of the spinous processes of the vertebræ, and to the muscles and tendons near the spine. The operation occupied twenty-one minutes; and the loss of blood was very trifling.—The skin was found to adapt itself very well to the denuded parts, and was secured by strips of adhesive plaster, compresses and bandages.

The greater part of the sore united by the first intention; no unpleasant symptoms occurred, and the patient was discharged cured, on the 15th April. She is at this time, and has been ever since the operation, perfectly well.

The tumour was found to weigh twenty-five pounds, but when filled with blood, was probably much heavier.

The tumour of Eleanor Fitzgerald, described by Mr. John Bell; and that of a negro woman, published in the Medical Repository of New York, (Vol. III. New Series) were of enormous magnitude, but adherent by small bases. The basis in the present instance was very great, and I am not aware that so large a tumour has been ever before extirpated.

REMARKS.

The most important practical precept derived from this case, is the influence of position on the circulation of the blood. I once attended an operation on a tumour of comparatively small size, seated on the back, the extirpation of which was found impracticable, in consequence of bleeding from the superficial veins. In the treatment of hemorrhagy from blood vessels in the extremities, and on certain local inflammations, an elevated position is often found of great importance. I have seen a bleeding from an artery in an aneurismal arm, in which circumstances precluded the use of a ligature or tourniquet, effectually arrested by an elevated posture, the hand being constantly kept in a vertical position.

These remarks, although somewhat digressive, are in my opinion of too much importance to be omitted. The practice of employing position to empty blood-vessels for surgical purposes, in the case alluded to, and others, so far as I know, originated with Dr. Physick, and my own experience has afforded numerous proofs of its value, and convinced me that it has been too much neglected by surgeons.

CHAPTER XLIV.

Of Warts and Corns.

MOST persons are acquainted with the usual appearances of WARTS. They are generally situated in the hands and fingers; they are a sort of excrescence composed of fibres projecting from the cutis vera, or parts below. They do not acquire a large size, but sometimes become irritable and painful, and when scratched or bruised they bleed and occasionally ulcerate.

The best method of treating them is by stimulating applications: such as tincture of cantharides,—strong vinegar,—caustic volatile alkali,—the various escharotic salts, as corrosive sublimate,—blue vitriol; and if these fail, the wart should be destroyed by means of lunar caustic, or nitric, or sulphuric acid.

CORNS are as familiarly known as warts; the former fashion of tight shoes has crippled a great many belles and beaux of the last age.

Corns are generally situated on the joints of the toes, and consist in a great induration of the skin, sometimes extending into the cellular substance below. At times they are indolent, but irritation in walking excites great pain, and changes of the weather in some persons, always occasion extreme pain.

To relieve the inconveniences of corns it is essential that the patient wear loose and soft shoes. When the corn is covered with a mass of thickened cuticle, the foot should be soaked in warm water, and this cuticle pared off. A very excellent mode of defending the corn from

the pressure of the shoe, when the patient walks, is to spread several small pieces of leather with adhesive plaster; in the centre of these leather strips, a hole is to be cut rather larger than the corn. They are to be applied successively over the toe or foot in such a manner that the corn shall be surrounded by the leather, and the shoe will then press upon the leather, the corn remaining untouched. When situated on the sole of the foot, a felt or cork sole should be worn with a hole cut in it opposite to the corn.

Mr. S. Cooper states that a corn may be infallibly cured by the following method. "The corn is to be rubbed twice a day with any emollient ointment, and in the interim it is to be covered with a softening plaster. Every morning and evening the foot is to be put for half an hour in warm water, and whilst there the corn is to be well rubbed with soap; afterwards all the white pulpy outside of the corn is to be scraped off, taking care not to give the least pain. The same treatment is to be continued without interruption until the corn is totally extirpated, which generally happens in eight or twelve days."

CHAPTER XLV.

Of the Inverted Toe nail.

A DISEASE frequently occurs in the great toe, productive of more inconvenience and distress than the worst corns;—an inversion of the nail of the great toe which grows in upon the flesh; generally in consequence of wearing a tight shoe.

This complaint is attended with severe pain and inflammation, sometimes with ulceration, a fungus arises in many cases which is extremely sensible, and gives great pain when touched, so that the patient is completely incapacitated from walking. The nail in many cases becomes completely imbedded in the flesh, and in others a thick skin forms over the greater part of it. Distressing spasms occasionally result.

In general, persons afflicted in this way, are in the habit of cutting the nails short, and interposing lint between the flesh and its edge; but this does not retard the progress or remove the pain of the complaint. The use of caustic is also ineffectual, and although it removes the fungus, yet this is speedily reproduced.

Desault published a memoir on this complaint, and his curative indication consisted in keeping the nail and flesh separated. He effected it by taking a plate of tin, an inch and a half long, and about a quarter of an inch wide, and introducing it between the tumefied flesh and the edge of the nail; he afterwards raised up the nail by depressing the flesh, which served as a point of support to the plate, and which was covered with a small compress spread with cerate, to defend it; then he bent back

the plate from within outward, in such a manner as to embrace exactly the prominence formed by the flesh, and secured it by a small bandage rolled around the toe. After this the foot was poulticed.

This operation succeeded with Desault, but he states that it is exceedingly painful, and as the process must be repeated daily, the pain is repeated as often. I therefore take the liberty to recommend a simpler, easier, and more effectual remedy,—the excision of the inverted edge of the nail.

Before commencing the operation, the foot should be soaked in warm water to soften the nail; with a sharp strong bistoury the nail is to be slit down near the edge completely to the root, this portion is then to be carefully, but quickly, detached from the soft parts, after which a poultice is to be applied. The whole success of the operation depends on removing radically every vestige of the nail at its root, after which the parts readily heal, and a radical cure is effected. The relief procured by this operation is hardly credible by those who have never witnessed it. It is well however for the surgeon to be aware, that it is an operation as painful as almost any he will be called on to perform, and therefore he should complete it as speedily as may be consistent with a certainty of removing the whole offending part.

CHAPTER XLVI.

Of Paracentesis Abdominis.

THE operation of tapping the abdomen in cases of dropsy, is performed usually by introducing a trochar through the parietes of the abdomen, through the canula of which the water is allowed to escape. The place at which this puncture has been made, until within a few years, was at the middle of a line drawn from the umbilicus to the superior anterior spinous process of the os ilium. The left side was chosen to avoid the liver. It has however happened in several instances that the epigastric artery pursuing an unusual course has been punctured in this operation; and, in other instances, the trochar instead of perforating the linea semilunaris, as was intended, has pierced through the thick muscular parietes of the belly, and occasioned much pain and inflammation. This mode of operating, therefore, has been universally deserted, and surgeons now insert the trochar through the linea alba, two or three inches below the navel, in a direct line towards the symphysis pubis.

The opening may very conveniently be made with a common trochar, or with a flattened trochar, but Dr. Physick has in my opinion greatly improved the operation, by substituting for the trochar a lancet, which makes a clear incised wound, through which a flattened canula is inserted. The incision heals readily without inflammation.

The most convenient mode of performing the operation is, to place the patient near the edge of the bed, and

under him a piece of oil cloth to prevent the fluid from wetting the bed clothes. The lancet is then inserted through the parietes of the abdomen, about two inches below the navel, and as soon as it is removed the canula is introduced. To prevent the edges of the canula from irritating any of the abdominal viscera, a smaller one closed at the extremity and terminating in a smooth polished surface perforated with several holes, is to be introduced after the water has flowed a short time. If these cannulae, however, be not at hand, a common female silver catheter and a lancet may be substituted, and with these instruments the operation has frequently been very well performed. In order to prevent the unpleasant effects which sometimes result from the sudden removal of the water, it is necessary after a portion has flowed out, to compress the belly in various places, by means of the hands of assistants, or by passing a sheet round the abdomen, the two ends of which are to be drawn by assistants, and after the operation is completed to apply a bandage moderately tight round the abdomen. The current of water sometimes suddenly stops before the whole of it is discharged, in consequence of a portion of intestine or omentum getting before the aperture of the canula, this is to be removed by introducing a probe or director. The fluid is sometimes too viscid to flow through the small apertures of a female catheter, in which case they must be enlarged, or a canula introduced open at the extremity. The only dressing the wound requires is a dossil of lint, or a strip of adhesive plaster.

It is generally necessary in cases of dropsy to repeat this operation frequently. In these cases the puncture should never be twice made in precisely the same spot, because it has happened that adhesion has formed, connecting an intestine to the cicatrix, and the intestine has been wounded in a subsequent operation.

Dropsy of the ovaria is a case sometimes demanding paracentesis. The tumour in this case commences on one side, and seems to rise out of the pelvis; gradually enlarging, it at length fills the greater part of the abdomen, and in its latter stage cannot from its appearance be distinguished from ascites, which from the beginning is attended by an equal, uniform swelling of the abdomen.

The cyst of the ovary which contains the fluid in ovarian dropsy commonly adheres in various places to the peritoneum so that there is no particular danger in tapping it. The operation is to be performed in the same manner as in ascites, and generally in the same place; but if one part of the abdomen be more prominent than the rest in ovarian dropsy, the lancet should be inserted at that part. It only palliates the disease, and must in general be frequently repeated. Le Dran in some cases laid open the cyst of ovarian dropsies. His patients survived and were cured of the dropsy, but a fleshy tumour formed, which gradually increased and destroyed the patient, or else incurable fistulous ulcers remained.

Attempts have been made to cure this complaint by injecting wine after evacuating the cyst, as in cases of hydrocele, but death has generally resulted, sometimes from the inflammation immediately subsequent, and at other times a more lingering termination has taken place.

The seton has also been tried without success, and the best plan I believe is to evacuate the water occasionally in the manner which has been described.

Paracentesis is sometimes but very rarely necessary for the evacuation of air in cases of Tympanites. It may be performed in the same way as for the evacuation of water.

CHAPTER XLVII.

Paracentesis Thoracis.

THE thorax is sometimes opened for the purpose of discharging water, air, pus, or blood, which may have collected from accident or disease.

The manner of performing this operation is essentially different from that of tapping the abdomen. The place at which to make the aperture is, between the sixth and seventh true ribs, equi-distant from the spine and sternum. An incision about two inches long is to be made through the integuments of this part with a common scalpel; the intercostal muscles are next to be carefully cut through by an incision smaller than the external one. The pleura costalis is now exposed, and a small puncture may be made through it. Water, air, pus, or fluid blood, will readily escape through a small aperture, but if coagula be found the incision must be enlarged. In order to avoid the intercostal artery, it is safest to cut through the muscular flesh close to the upper edge of the lower rib. In order to evacuate the fluid, the patient after the puncture should place the wound in a depending posture, by lying on his side. After the evacuation of the contents of the pleura, the wound is to be closed, and dressed with adhesive plaster.

Mr. Richerand of Paris, has proved in a very brilliant and successful operation, that the thorax may be freely opened by removing portions of the ribs, if requisite, for the removal of cancer. He proposes in cases of dropsy of the pericardium, to cut down to this sac,

and evacuate the water. This operation has never been performed; but in a clearly marked case (if such could occur) may certainly be regarded as practicable, and Mr. Richerand's opinion that the heart and pericardium might be made to adhere, as the testicle and tunica vaginalis, in cases of hydrocele, is not void of plausibility. I regret that I received his interesting memoirs too late to notice it in its proper place.

CHAPTER XLVIII.

Of Bloodletting.

FOR the cure of numerous morbid affections, blood must be evacuated. The means of drawing blood in use among medical men are several.

General bleeding is performed by opening a vein, an operation called phlebotomy or venesection, and the puncture of an artery called arteriotomy.

Topical or *local* bloodletting is performed by means of leeches : by opening the vessels of a part with a lancet or knife ; and by cupping.

PHLEBOTOMY OR VENESECTION is the most frequent and one of the simplest of surgical operations.

It is usually effected by opening a vein in the arm. A band or ligature is to be applied around the arm between the vein to be opened and the heart ; in consequence of this ligature the vein swells and becomes turgid : the bandage, however, should never be drawn so tight as to intercept the blood by the arteries, and it will be well, previously to applying the ligature, to feel for the pulsation of the artery in order to learn its precise situation. A vein is now to be chosen sufficiently turgid and superficial, and sufficiently remote from the artery ; this vein is to be opened by a lancet, or German fleam. If the lancet is to be used (and most *surgeons* recommend it) it should be exceedingly sharp, in which case the shape of it is not so important as many have supposed, since it is easy with a very sharp lancet to make an aperture of any requisite size in the vein. When the left hand, the thumb of the

left hand is to be placed on the vein a little below where the puncture is to be made in order to fix the vein, but care should be taken not to alter the relative position of the skin and vein, because in regaining this position after the lancet is inserted, the aperture through the skin will no longer correspond with, or be opposite to that in the vein, in consequence of which a thrombus or ecchymosis will form—a very common accident in venesection. The lancet is to be pushed into the vein, and when its point is within the cavity of the vessel it is to be carried forward a little, so as to enlarge the opening sufficiently. The arm is to be kept extended after the operation until the necessary quantity of blood is taken. If the blood should not flow as freely as is desired, the patient should exert the muscles of the arm by grasping a stick, or moving the fingers.

After the blood is drawn the arm is to be wiped, and the sides of the orifice neatly approximated in the manner directed by Mr. Hunter, which has been described in the chapter on wounds of veins, vol. 1. page 100.

The external jugular vein is sometimes opened. The head should be laid on one side, and the vein is to be compressed by the surgeon's thumb near the clavicle, and the opening made in that part of the vein which lies over the sterno-cleido-mastoid muscle. The blood soon ceases after the pressure is removed, but a small strip of adhesive plaster is sometimes necessary.

Veins in the legs and feet can sometimes be found in children when there are none visible in the arm. To promote their distention, and to encrease the bleeding from them it is useful to immerse the limb in warm water.

The German fleam or spring lancet I prefer greatly to the common English lancet for phlebotomy; it is now in some parts of the United States almost exclusively used. I shall insert some remarks on this subject which I pub-

lished in an edition of Cooper's surgical dictionary in 1810. "In a country situated like the United States, where every surgeon, except those residing in our largest cities, is compelled to be his own cutler, at least so far as to keep his instruments in order, the spring-lancet has a decided preference over the lancet; the blade of this can with great ease be sharpened by any man of common dexterity, and if not very keen it does no mischief, whereas a dull lancet is a most dangerous instrument; and no one can calculate with certainty the depth to which it will enter: to sharpen a lancet, is regarded by the cutler as one of his nicest and most difficult jobs; it is one to which few surgeons are competent.

"The *safety* of using the fleam is demonstrated by daily experience; there is no country in which venesection is more frequently performed than in the United States, and *perhaps none where fewer accidents from the operation* have occurred, of these few, I beg leave to state, that all the aneurisms produced by bleeding, which I have seen, have been in cases where the lancet was used." I have since however met with an exception to this statement. I have seen the brachial artery opened by a spring-lancet, but it was by an old barber, half blind, and very clumsy.

"The manner of using the spring-lancet differs in nothing from the operation with the common lancet, excepting that the surgeon must place the instrument in such a situation, over the vein, that when the spring is touched, the orifice into the vein will have a proper size and direction. Dexterity in this is very readily and speedily acquired. In point of *facility* in its use it has a great advantage over the lancet.

"Among the advantages of the spring-lancet *economy* is not the least. A country practitioner who is constantly employing the English lancets, and who is particular in using none but the best, must necessarily consume half

the emolument derived from the operation, in the purchase of his instruments. One spring-lancet, with an occasional new blade, will serve him all his life."

ARTERIOTOMY.

Arteriotomy is commonly performed by puncturing the trunk or branches of the temporal artery. The vessel in general lies so near the surface that a lancet may easily be inserted into it—after enough blood is evacuated the bleeding is readily arrested by applying a compress and bandage. When difficulty is experienced in stopping the bleeding, it has been found useful to divide the artery entirely; which facilitates, if Dr. Jones's experiments be not fallacious, the natural process by which the bleeding is stopped.

CUPPING.

Cupping consists in extracting blood by an exhausted receiver from punctures made in the skin. It is performed by means of a scarificator, and a small bell glass, or tin cup, the mouth of which is more contracted than the bottom. The scarificator is an instrument containing from sixteen to twenty small lancets, which start out when a spring is touched, and make the necessary punctures of a proper depth; the depth being regulated by means of a screw. The small cutaneous vessels only are divided in this operation, and it is necessary to promote the bleeding by applying the cups, exhausted of air, or rather filled with air greatly rarified, over the punctures. This part of the operation is effected by moistening the skin with warm water, and by heating the air in the cup by the flame of a small lamp (which requires much dexterity and practice, but is certainly the best method) or by a piece of paper, or tow

dipped in spirits of wine and inflamed, which is thrown into the cup immediately before its application. In this manner a powerful suction is made and the blood flows into the cup: when the cups are moderately full they may be emptied and reapplied.

It is best to apply the cups before making the scarifications, in order to render the vessels turgid, and they bleed more freely after this manœuvre.

LEECHING.

Within a few years leeches have been found in great abundance, and have been introduced extensively into practice in this city, and in other parts of the United States. Bleeding by leeches occasions less irritation than cupping, and is preferable in a great number of cases. The mode of using them which succeeds best in the hands of those whose business it is to apply them, consists in confining a number of the leeches in an inverted glass or cup, over the part from which the blood is to be drawn, and this part is previously smeared with blood drawn from the operators finger by a lancet or pin, from time to time the glass is taken up to ascertain when the requisite number have adhered, and when this is effected the glass is removed, and the leeches after filling themselves with blood successively drop off. The leechers in this town generally moisten their leeches, with warm water to enliven them.

CHAPTER XLIX.

Of Ulcers.

AN ulcer is a solution of continuity in a soft part, discharging pus.

Ulcers arise from various accidental injuries which are succeeded by inflammation and suppuration, as from wounds, bruises, burns, &c. They also occur in all cases where a part of the body has been destroyed by mortification, and they are the result of certain morbid actions attended with local inflammation, as scrofula, syphilis, &c.

The nature of the ulcerative process has been already cursorily explained in the chapter on inflammation, and a very short account of the manner in which injured parts are restored, has been offered in the commencement of the present work—it will not, however, be unprofitable to enlarge a little on the latter subject, because the cure of ulcers must be attempted under great disadvantages, by one who is but partially acquainted with those operations of nature which it is his business to facilitate.

When a part of the body is wounded, blood is poured out, and this blood sometimes becomes the bond of union; at other times this effect does not happen, but inflammation arises, and coagulating lymph is secreted and poured out, and this forms the uniting medium. But the circumstances of an ulcer differ very materially from those of a wound. The absorbent vessels have removed in cases of ulcer a portion of the original flesh, and a vacuity more or less considerable is occasioned by this loss of substance. The whole nature of the part is

changed—it is no longer skin, or muscle, but a secreting surface, constantly inflamed, and pouring out a fluid.

A wound, however, may very readily be converted into an ulcer, and the change takes place in the following manner. In every wound there is a solution of continuity in a soft part; blood is poured out and generally fills the cavity of the wound; the bleeding having ceased, this blood coagulates. Inflammation succeeds, and the part becomes red, tense, swollen, hot, and painful. The coagulated blood putrefies, and dissolves, emitting an offensive odour; the first discharge therefore from the wound is putrid blood; but soon after a secretion of serum takes place, and this mixes with the putrid blood and flows out together with it. The serous thin discharge gradually becomes changed in colour and consistence, approaching more and more in its appearance to pus, and generally in four or five days the inflammation having abated, pure pus is discharged. In order for the restoration of suppurating wounds something more is requisite than what takes place in those which are healed by the first intention. “For there is always a considerable gap, by the opposite parts retracting from each other. This gap is, of course, greater in wounds with loss of substance, than in others; but it occurs in all. In order to fill up this vacancy, a growth of new flesh is necessary, and accordingly there sprouts up a new kind of substance, which is named granulations, from all the inflamed surfaces.

“This substance is of a florid red colour, it arises with small irregular round points, something like little grains (hence the name) or rather resembling the head of a cauliflower.

“The surfaces of the granulations are moist by their constantly secreting pus; and they are so tender that they bleed if touched a little roughly. This delicate production springs up in a very irregular manner from the

whole suppurating surfaces; in some parts it sprouts up exuberantly, sending forth pyramids and columns; while in others it goes on very slowly.

“In general the principal growth is from the bottom and deeper parts of the wound, very little arising from the superficial.

“When two granulations come in contact, they adhere and grow together. In this manner they increase and unite, until the whole cavity of the wound is filled with them as high as the skin.

“This new flesh is of the same nature and appearance, from whatever part of the body it springs; even that which arises from bones, differs in no respect from that which grows from the softest parts. When granulations are cut, they appear a uniform mass without fibres running in any particular direction. They seem principally composed of blood-vessels; and as the blood circulating in them is nearly in contact with the air, it acquires the florid red colour, which good blood always receives when in that situation. There are a great many lymphatics in granulations, which is proved by salivations having been induced by dressing sores with mercurial applications. Nerves likewise enter into their composition, as is evident from their sensibility; and besides this congeries of vessels and nerves there is probably a connecting substance uniting all these parts together.

“Such is the nature of the new flesh which arises to fill up a suppurating cavity, and to unite the solution of continuity. But this substance does not begin to spring up for the first three or four days. During that period the fever is high, there is a great deal of redness, hardness, and tension, in all the parts contiguous to the wound, and the pain and heat are considerable.

“These symptoms gradually diminish. At length all pain and tension disappear, and the redness is confined to the surface of the sore, and less than a quarter of an

inch around it. The discharge, likewise, also alters materially. It is at first of a thin consistence, of a serous colour and offensive smell; and by degrees it becomes thick and viscid, of a yellowish or white colour, and nearly inodorous." (MOORE.)

The parts are now in the condition of a healthy or healing ulcer, and resemble those ulcers which arise from the separation of mortified flesh, and all such as are attended with no local or general morbid affection, and in which the parts have sufficient strength to effect the process of restoration.

In a simple or healthy ulcer as the granulations arise the discharge is diminished in quantity, and becomes thicker in consistence; at length the deficiency of substance is repaired, and there remains no longer a cavity, but the granulations are on a level with the surrounding skin, or elevated somewhat above it. The process of cicatrization or the formation of skin next commences.

"The formation of the cicatrix begins from the edges of the old skin. The redness which existed during the inflamed state abating, the swelling subsiding, and the edges of the sore uniting with the rising granulations. The margin then acquires a bluish white or pearly colour, which gradually extends itself to the centre, till the whole sore is covered with new skin. It sometimes happens in broad sores, that cicatrization takes place not only from the circumference, but likewise from one or two points in the centre; these appear like islands in the midst of a sea of granulations; they are of the same colour as the healing margin; and they become larger by extending in every direction. In consequence of cicatrization going on from different central parts, it happens not unfrequently during the progress of healing, that one broad sore is divided into two or three smaller ones; and when this happens, the cure must go on faster. There is always more or less of a cuticular co-

vering upon the cicatrix, which being constantly moistened by the discharge from the granulations, is soft and pulpy, and occasions that whitish colour observable on the edges of healing sores. I have sometimes removed this cuticular substance, and have observed underneath the real new skin, which seems a very fine membrane of a red colour, the granulations shining through it.

“When a suppurative sore is nearly healed, if it is not kept moist by some application, a scab is apt to form in the same manner as in those wounds which are healed by the first intention. This crust consists of pus dried by the evaporation of the watery parts; the new skin forms under it, and it soon after falls off.

“From the surface of the cicatrix there is no secretion; there are only the perspirable vessels. While it is forming it is kept moist by the discharge from the uncovered granulations; but when completely formed, the cicatrix is as dry as any other skin.

“It appears that the new skin at first cannot form a good cuticle and rete-mucosum, for there is always a succession of scales falling off for sometime; at last this ceases, and the new skin is covered with a good cuticle and rete-mucosum, like other parts. The cicatrix changes successively from a reddish colour to a brown; and lastly it becomes whiter, and of a more shining appearance than the original skin. This is a curious circumstance and merits some attention.

“The cutis, as every anatomist knows, is not a smooth polished membrane, but is full of eminences, which are named papillæ. These, in some parts of the body, run in waving rows, and form in others irregular lozenges and triangles. The rete-mucosum and cuticle which lie immediately over the cutis, are marked with furrows analogous to the eminences of the cutis. The cuticle is of a light colour and semi-transparent. The rete-mucosum, is white, yellowish, brown, or black, in men of

these various colours. And the cutis is extremely vascular ; the blood contained in these vessels shines through, and gives the florid fleshy tint to the body.

“The colour of the skin, then depends partly upon the rete-mucosum, and partly upon the blood which circulates in the cutis. In white men the cuticle and rete-mucosum, which cover cicatrices, appear similar to that which covers other parts ; but there is a great difference in the quantity of blood, which circulates in the old and new skin. For the new is far less vascular than the old ; or, at least, the greater number of its vessels are of a much smaller diameter, and admit a lesser quantity of red globules of the blood. It happens in consequence of this that the cicatrices are of a whiter colour than the original skin. In negroes the reverse takes place, their scars being generally blacker than other parts, owing to a darker rete-mucosum forming in them upon scars, than upon the old skin.

“Besides the difference of colour, a cicatrix has a glossy, shining look, which the skin does not possess : this is owing to the scar being a smooth polished membrane without hair, or any of those papillæ, which are upon the cutis ; both the papillæ and hair are parts which are formed in the first organization of the body, and are never afterwards produced.

“As scars are less vascular than the old skin, it is probable that they have fewer nerves ; for blood-vessels and nerves are generally in proportion to one another. But as nerves can hardly ever be traced to the surface of the body, we can only judge of their number there, by the degree of sensibility ; and this is considerably weaker in cicatrices than in old skin. This indeed might naturally be expected, for scars have no papillæ, which are supposed to be the principal seat of the sense of feeling in the skin.

“It is observed that scars are generally far less moveable than the original skin; the latter being commonly attached by a loose cellular membrane to the deep seated parts; whereas the scar forms itself immediately upon the granulations, and is so intimately connected, as to make the same substance with them. This is the reason, likewise, that although a scar is at first exactly level with the skin, yet after a certain period, it is often depressed. For during the healing of a sore, particularly if the discharge is great, the fat and neighbouring flesh are considerably wasted by absorption. But when the whole is healed, the internal parts recover their bulk, and the fat is regenerated. The skin being attached loosely, readily yields and accommodates itself to this increase; whereas the cicatrix adhering closely, and being as it were tacked down to the parts upon which it is formed, appears depressed.

“It sometimes happens that a cicatrix instead of being depressed, rather projects above the skin owing to the exuberancy of the granulations upon which it is formed; and very often the scar has an irregular, unseemly appearance, from the granulations rising to unequal heights.”

With respect to the nature of the new-formed parts various opinions have existed. It is certain, however, that in some cases they resemble somewhat the original flesh, the deficiency in which they are intended to supply, and in other instances the parts newly formed differ very essentially from it.

Mr. Moore observes that “in some cases the body is unable to produce any new substance to supply the place of that which was lost, and nothing more is attempted than simply to throw a cicatrix over the sore. In other cases a new substance is formed which fills up the vacancy, but is incapable of performing the office of the old,

and lastly it sometimes happens that a new substance is produced similar to the old and fit for all its offices."

The quantity of new parts formed is not always equal to the parts which have been lost, and in the healing of certain ulcers, a great difference is observed between the size of the original sore and that of the cicatrix, which remains after it has healed, owing to the power which the granulations have of contracting. This is most evident in ulcers seated in parts where the skin is loose: in such cases plaits or folds are often formed in the skin in consequence of the contraction of the granulations. The healing of a sore is much expedited by this process.

This long account of the healing of ulcers I consider by no means unimportant, as it will preclude repetitions in the remaining pages.

The SIMPLE OR HEALING ULCER then it appears needs no surgical treatment, but requires only rest to enable the parts to restore themselves; cleanliness is however necessary, because filth like all other irritating matters will occasion inflammation and thereby retard the cure.

Notwithstanding the tendency of the healthy ulcer to cicatrize, it is a fact that trifling circumstances influence very materially the rapidity of the cure, and therefore Mr. Home very properly advises the dressings to be such as best agree with the granulations, and with the surrounding skin. In general dry lint is the best application, as it absorbs and retains the matter from the sore, and serves as a soft covering for the granulations; over this lint it is proper to apply a pledgit spread with simple cerate, to prevent the evaporation and drying of the matter, and to facilitate consequently the removal of the dressings.

In many instances moderate pressure promotes the healing of an ulcer, and in others it retards it: some ulcers heal most readily when dressed with simple cerate,

and others when allowed to scab and dry. Mr. Home does not ascribe these variations to disease, but to constitutional causes, for the ulcers heal as soon as the particular things which disagree with them are discontinued. It is proper therefore to ascertain from patients having ulcers, what particular applications have formerly agreed best with their sores, because both in healthy and diseased ulcers it will be proper to avoid those dressings which have proved injurious.

Various circumstances take place to interrupt the healing of ulcers, and accordingly we find many of them very obstinate and difficult of cure. It would be an endless labour to describe all these circumstances. I shall therefore detail the appearances and treatment of those ulcers most frequently met with.

Ulcers are more frequently situated in the legs than in any other part, and are more obstinate from circumstances which it is not necessary to explain. Mr. Home in his excellent treatise on the present subject, has described the various ulcers which are met with under six different divisions.

1. Ulcers in parts which have sufficient strength to carry on the actions necessary for their recovery.

2. Ulcers in parts that are too weak for that purpose.

3. Ulcers in parts whose actions are too violent to form healthy granulations whether this arises from the state of the parts or of the constitution.

4. Ulcers in parts whose actions are too indolent, whether this arises from the state of the parts or of the constitution.

5. Ulcers in parts which have acquired some specific action either from a diseased state of the parts or of the constitution.

6. Ulcers in parts which are prevented from healing by a varicose state of the superficial veins of the upper part of the limb.

Dr. Physick in order to describe the usual appearances of old ulcers, classes them under the following heads, some of which are noticed and some omitted by Mr. Home, viz.

1. The inflamed ulcer.
2. The fungous ulcer.
3. Ulcers seated in œdematous limbs.
4. The sloughing ulcer.
5. The indolent ulcer.
6. Ulcers attended with carious bone.
7. Ulcers attended with varicose veins.

8. Ulcers attended by specific diseased actions. I shall adopt the latter arrangement in the following pages.

The appearance of a healthy ulcer such as Mr. Home describes in his first division, has already been mentioned. The granulations in such an ulcer are small, firm, florid, and somewhat pointed at the top. They secrete pus of a light yellow or whitish colour, of a thick consistence, separating readily from the surface of the sore. When the granulations arrive at the level of the surrounding skin, cicatrization takes place in the manner already described.

But if from accidental irritation, or from constitutional affection, inflammation runs so high as to interrupt the process of healing, the condition of the ulcer is materially changed.

CHAPTER L.

Of Inflamed Ulcers.

IT might be supposed by persons unacquainted with the subject that no difficulty could exist in distinguishing from the appearance, an inflamed ulcer from any other, but the fact is otherwise, and although the circumstances of the cases considered in connection, sufficiently discriminate the inflamed ulcer, yet except in strongly marked cases, the mere aspect of the sore is not sufficient to enable the surgeon to decide whether an ulcer is inflamed.

An inflamed ulcer in general puts on the following appearances.

The surrounding parts are red, swelled, and very sensible to the touch; the blood pressed out of them with a finger quickly returns, and the red colour with it; the margin of the sore is ragged, the skin terminating in a sharp elevated edge around it; the bottom of the ulcer is made up of concavities and no distinct appearance of granulations is seen—a whitish spongy substance existing in their room formed of coagulating lymph. The discharge from an inflamed ulcer is thin and serous, and by no means resembles healthy pus. The surface of the sore is acutely sensible, and often bleeds when touched or irritated.

The pain attending an inflamed ulcer is in some cases very great; in general it is not constant, but comes on usually in the evening, and continues several hours, attended in some cases with spasms of the limb.

The ulcers on the legs of sailors and intemperate persons generally exhibit, on their admission into a hospital, the symptoms and appearances just described, and that such ulcers are inflamed there can be no doubt.

When, however, these marks are not present, the history of the case and the effects of medicines upon the sore enable us to decide, and it is in general a good rule to consider all doubtful cases as inflamed, because the remedies indicated will do no mischief in any case in which this point is doubtful, and their ill success in case of error will be speedily apparent without any serious or permanent injury.

The treatment of an inflamed ulcer consists in the use of the common remedies for inflammation—Rest in a horizontal posture—a low diet—purging and occasionally blood-letting. The best local application is a soft bread and milk, or linseed poultice. When by these measures the inflammation is lessened and the sore assumes the appearance of a healthy ulcer, it is to be treated as has been already directed.

CHAPTER LI.

The Fungous Ulcer.

INSTEAD of the healthy appearance of florid pointed granulations of a firm texture, the fungus ulcer is covered with large round granulations rising above the level of the surrounding parts; they are less compact in texture, and appear somewhat transparent; they have no disposition to cicatrize. In some cases the sensibility of the granulations is greater than in healthy sores, and bleeding takes place from every accidental irritation—at other times they are not very sensible and less vascular than healthy granulations.

The treatment of fungous ulcers is to be commenced by pressure made with a bandage and roller, or by dressing in the manner recommended by Mr. Baynton for the cure of old ulcers, which will be described when the treatment of indolent ulcers is considered. If the pressure should not prove successful, escharotic applications are to be used; the red precipitate answers in many cases very well, but should this fail lunar caustic is to be applied, and the granulations around the edges of the sore are to be destroyed by this application, after which the ulcer may be dressed twice a day with simple cerate and a roller of muslin. Should the ulcer be of small size the whole surface may be touched with caustic at once.

It is worthy of remark, however, that in some cases an ulcer will shoot up fungous granulations after the application of lunar caustic or red precipitate, and this disposition will be effectually checked by an application of blue vitriol. The use of burnt alum is in many cases extremely serviceable in repressing fungous granulations. Various

astringent lotions are also useful; a decoction of oak galls; solutions of white vitriol, and other metallic salts have been found beneficial. It is my custom therefore always to vary the escharotic medicines in such cases, and sometimes the ulcer heals under the use of one which in other cases has no effect.

The great extent to which fungous granulations proceed in some cases is truly surprising. Cancerous ulcers sometimes shoot out a fungus, which grows so rapidly that its increase in volume is almost visible. It is exceedingly difficult in such cases to repress the fungus; the older surgeons employed wooden cups which were bound fast upon the ulcer, and by means of these they compressed the granulations. Stimulating applications aggravate the complaint, and are therefore inadmissible; moderate pressure ought to be applied, and antiphlogistic measures should be employed to mitigate the pain and inflammation which attend.

CHAPTER LII.

Of Ulcers in Œdematous Limbs.

ŒDEMA signifies an extravasation of water into the cells of the cellular texture, and is a local anasarca, differing from general dropsy only in extent. It depends therefore frequently upon general or constitutional causes, but also very often upon local circumstances, and proceeds from fractures, sprains, and bruises. Interruptions to the circulation of a part in some cases produce this effect, and œdematous swellings result from the pressure of a tumour upon the principal vessels of a limb. In the latter months of pregnancy œdematous legs are very common.

An œdematous limb is usually cold, swollen, and of a pale colour. It retains the mark or pit made by the pressure of a finger. An ulcer seated in such a limb is generally painful and somewhat inflamed. The granulations have not a healthy appearance, but are purple, and in spots appear gangrenous or sloughy. Great pain is sometimes felt, and the ulcer remains stationary or spreads in extent.

Ulcers in œdematous limbs very frequently are attended by so much fever that blood-letting is indicated, and repeated purges are often necessary. In many instances, however, the patient's strength is so much reduced that these remedies cannot be used, and in such cases Dr. Physick's plan of elevating the feet of the bedstead has a very happy effect in diminishing the bulk of the limb, and in abating the inflammation of the ulcer. In addition to this, gentle pressure is to be made by means of a roller of muslin or a laced stocking extending from the

foot to the knee, and the ulcer is to be dressed with strips of adhesive plaster, its edges being approximated as much as possible.

Under this treatment the ulcer generally heals, but the bandage or laced stocking should be worn for a considerable time, to prevent its recurrence.

It is the custom with many practitioners to recommend exercise to patients with ulcers in œdematous legs; this treatment I believe to be very injurious, and although cases are brought forward to attest its efficacy, it is extremely probable that these cures would have taken place without the exercise, and in a much shorter space of time; in proof of this I would remark that when an œdematous limb is in a depending posture during the day, it is found greatly swelled at night, and of course the cells of the cellular texture are distended, and the vessels of the ulcer and adjacent parts are stretched and irritated—a condition surely unfavourable for the healing of the sore.

CHAPTER LIII.

The Sloughing Ulcer.

IN consequence of deficiency in the strength of the constitution or part affected, the granulations of an ulcer very frequently mortify, and sloughs fall off from various parts of the ulcer, and sometimes from its whole surface; in some cases this sloughing takes place after the cuticle is formed, the new skin becoming purple, livid, and black.

The sloughing of an ulcer sometimes depends on local causes, and it has happened that an ulcer on one leg of a patient has healed up whilst the sloughing was going on in a sore on the other leg. That general or constitutional causes often occasion ulcers to slough there is no doubt, for change in diet or air frequently produce sloughing in ulcers which have been healing. In general pain and fever attend a sloughing ulcer.

Analogous to this species of ulcer is that in which the process of ulceration suddenly takes place, after a sore has been apparently healing. This is owing in Mr. Home's opinion, to the parts being too weak to carry on the actions necessary for their recovery: such ulcers Mr. Home remarks do not readily form skin and "in a still more weakened state of the parts the granulations after having gone on favourably for several days shall all at once give way and be absorbed into the constitution, leaving the ulcer as broad and as deep as it was before, the granulations not being strong enough to preserve themselves from decay.

"Ulcers may from the beginning exhibit these appearances of want of strength in the newly formed parts, or

they may at first go on for a few days in every respect like those in healthy parts, but become unable to do so beyond that period, and the granulations begin then to shew signs of weakness; for granulations of the most healthy kind if they are not skinned over in a certain time appear to lose their original strength and fall into a weak state."

In the treatment of the sloughing ulcer and of such ulcers as have just been described, tonics are requisite. The state of the system generally indicates them. Bark, wine, porter, and a generous diet are to be directed, and opium must be given to relieve pain.

The best local applications are those of a moderately stimulating kind. It has been usual to apply bark in powder to the sore, and lapis calaminaris, prepared chalk, plaster of paris, &c. A soft carrot poultice is to the patient pleasanter, and I believe in general answers better than any of these remedies. It is prepared by boiling scraped carrots in milk. Sometimes advantage is derived from washing the ulcer with diluted laudanum, or an infusion of oak galls. Mr. Home recommends spirit of wine and a decoction of poppies in equal proportions. He says "they must not be applied hot; they often soothe the sensations of the parts and lessen their actions. Where the granulations appear to be disposed to run into mortification, this application is sometimes the means of preventing it."

The sloughs having separated, the ulcer is to be treated as a simple healthy ulcer, but the state of the system in this as in every other form of the disease, must be strictly attended to, and general remedies adapted to it must be administered.

CHAPTER LIV.

Of Indolent Ulcers.

CHRONIC ulcers generally become indolent, and from the frequent interruptions to the curative operations of nature, incapable of forming healthy granulations. Indolent ulcers are generally characterized by appearances very unlike those of a healthy ulcer. "The edges of the surrounding skin are thick, prominent, smooth, and rounded. The granulations are smooth and glossy on the surface. The pus is imperfectly formed, but not thin and watery; it consists of pus and coagulating lymph mixed. The lymph is made up of flakes, and is with difficulty separated from the surface of the granulations, so that when the ulcer is wiped clean the coagulating lymph adheres in several places giving a white appearance to these parts of the ulcer. The bottom of the ulcer is commonly all of the same level or nearly so. The general aspect gives the idea of a portion of the skin and parts underneath having been for some time removed, and the exposed surface not having commenced any new action to fill up the cavity.

"These appearances are only met with in the truly indolent ulcers, in which the symptoms are the most strongly marked;" in others of this species the appearances very much resemble those that belong to the inflamed ulcer, and indeed we are sometimes only able to ascertain the difference by the effects of our remedies. It is to be recollected, however, that many indolent ulcers become at times inflamed, and when the temporary inflammation subsides revert to their old condition.

The treatment of indolent ulcers is a subject of ac-

knowledge and great difficulty ; it is also one of great importance, because by far the greater proportion of ulcers on the legs are of this kind, and the continuance of any other ulcers almost invariably produces these. It is this form of ulcer which fills the wards of hospitals and poor-houses, and which incapacitates from duty large numbers of soldiers and sailors.

In the treatment of indolent ulcers, Mr. Home observes our object should be “not simply to produce a cure, but to render that cure as permanent as possible. This is only to be done by changing the disposition of the granulations, and rendering them strong enough to stand their ground after the ulcer is completely filled up.”

In cases where inflammation supervenes upon an indolent ulcer the usual remedies for inflammation are to be employed, and when the inflammatory symptoms have subsided, Dr. Physick's practice has been “to remove completely the callous edges and the whole surface of the ulcer, and thereby to change its nature entirely by reducing it to the condition of a sore from accident.” The success of this practice has for many years been proved at the Pennsylvania Hospital, by the numerous and speedy cures of chronic ulcers of the legs. The modes of effecting the object are by means of the knife or caustic ; in general the latter is preferable. The edges of the sore will commonly be found most readily removed by rubbing a piece of caustic vegetable alkali fifteen minutes upon them, and care should be taken completely to accomplish this end. After the sloughs separate the granulations which arise will probably require very repeated applications of caustic, and the lunar caustic is then to be employed. It should be applied daily to the sore, but not in sufficient quantity to produce much sloughing. When cuticle begins to form, the caustic must be sparingly used, but still it must be used, and applied chiefly to the middle of the ulcer.

In order to stimulate the granulations of indolent ulcers, an almost endless variety of applications have been recommended; all the escharotic medicines—red precipitate—corrosive sublimate, green, blue, and white vitriol—nitric, muriatic, and sulphuric acid—caustic, and mild potash—carbonate of soda—alkohol, and numerous tinctures—gastric liquor—rhubarb—powdered galls—Peruvian bark, and a thousand other stimulating articles, all of which have in some cases proved beneficial, and in indolent ulcers a change of practice should be adopted whenever the sore becomes stationary, or worse.

I have applied with great advantage, powdered cantharides to certain indolent ulcers of the leg. The cases in which they have proved most beneficial are those in which there is a cluster of small ulcers, which have refused to yield to the common treatment. One remark I wish to make in this place with respect to local applications to indolent ulcers, which is, to vary them whenever they cease to produce a good effect.

I shall next detail Mr. Baynton's method of treating chronic ulcers, which has been adopted by almost every modern surgeon, and which ought to be used in conjunction with the remedies which have been recommended. I would premise, however, that Mr. Baynton accomplished his cures without pain or confinement, advantages obtained by few other surgeons, and the practice of allowing patients with ulcers to walk about is so generally injurious and so very rarely beneficial, that a prohibition of exercise ought in my opinion almost universally to be made.

“The parts should be first cleared of the hair, sometimes found in considerable quantities upon the legs, by means of a razor, that none of the discharges, by being retained, may become acrid, and inflame the skin, and that the dressings may be removed with ease at each

time of their renewal, which in some cases, where the discharges are very profuse, and the ulcers very irritable, may, perhaps, be necessary twice in the twenty-four hours, but which I have, in every instance, been only under the necessity of performing once in that space of time.

“The plaster should be prepared by slowly melting, in an iron ladle, a sufficient quantity of litharge plaster, or diachylon, which, if too brittle, when cold, to adhere, may be rendered adhesive by melting half a drachm of resin with every ounce of the plaster: when melted it should be stirred till it begins to cool, and then spread thinly upon slips of smooth porous calico, of a convenient length and breadth, by sweeping it quickly from the end, held by the left hand of the person who spreads it, to the other, held firmly by another person, with the common elastic spatula used by apothecaries; the uneven edges must be taken off, and the pieces cut into slips, about two inches in breadth, and of a length that will, after being passed round the limb, leave an end of about four or five inches. The middle of the piece so prepared, is to be applied to the sound part of the limb, opposite to the inferior part of the ulcer, so that the lower edge of the plaster may be placed about an inch below the lower edge of the sore, and the ends drawn over the ulcer with as much gradual extension as the patient can well bear; other slips are to be secured in the same way, each above and in contact with the other, until the whole surface of the sore and the limb are completely covered, at least one inch below and two or three above the diseased part.

“The whole of the leg should then be equally defended with pieces of soft calico, three or four times doubled, and a bandage of the same, about three inches in breadth, and four or five yards in length, or rather as

much as will be sufficient to support the limb from the toes to the knee, should be applied as smoothly as can be possibly performed by the surgeon, and with as much firmness as can be borne by the patient, being first passed round the leg, at the ankle-joint, then as many times round the foot as will cover and support every part of it, except the toes, and afterwards up the limb till it reaches the knee, observing that each turn of the bandage should have its lower edge so placed as to be about an inch above the lower edge of the fold next below.

“If the parts be much inflamed, or the discharge very profuse, they should be well moistened, and kept cool with cold spring-water poured upon them as often as the heat may indicate to be necessary, or, perhaps, at least, once every hour. The patient may take what exercise he pleases, and it will be always found, that an alleviation of his pain and the promotion of his cure, will follow as its consequence, though, under other modes of treating the disease, it aggravates the pain and prevents the cure.

“These means, when it can be made convenient, should be applied soon after rising in the morning, as the legs of persons affected with this disease are then found more free from tumefaction, and the advantages will be greater than when they are applied to limbs in a swollen state. But at whatever time the applications be made, or in whatever condition the parts be found, I believe it will always happen, that cures may be obtained by these means alone, except in one species of the disease, which seldom occurs. The first application will sometimes occasion pain, which however, subsides in a short time, and is felt less sensibly at each succeeding dressing. The force with which the ends are drawn over the limb, must then be gradually increased, and when the parts are restored to their natural state of ease

and sensibility, which will soon happen, as much may be applied as the calico will bear, or the surgeons can exert; especially if the limb be in that enlarged and incompressible state which has been denominated the scorbutic, or if the edges of the wound be widely separated from each other.” (BAYNTON.)

Mr. Baynton's direction to cover the ulcer completely with strips of adhesive plaster, is I think very injudicious, because the matter will be thus confined, and a kind of abscess formed, the anterior parietes of which are the plasters. Instead of this, it is better to make use of strips of plaster an inch in width, in large ulcers, and narrower in those which are small, placed at a distance of half an inch, one from the other, so that a free exit may remain for the pus secreted. In this manner indolent ulcers heal in general more readily than under any mode of treatment I have ever witnessed. His remarks on exercise I believe are altogether erroneous.

CHAPTER LV.

The Carious Ulcer.

ULCERS situated in the vicinity of carious or dead bone are prevented from healing until the exfoliation and separation of the bone are accomplished, and this in many cases is a very tedious process.

The manner in which exfoliation takes place has been already explained; the surgeon must necessarily wait until the bone becomes loose, after which he should without delay extract it.

Many chronic ulcers which succeed the venereal disease are prevented from healing by the presence of dead bone; these ulcers are not to be considered as venereal or treated as such, because after the separation of the bone is effected, they readily heal.

Carious ulcers are often fistulous, consisting of a canal with an indurated margin, discharging foetid sanies. Where a large carious ulcer exists, the foetor is often very great.

To hasten the exfoliation of carious bone is by no means an easy matter; the French surgeons employ with this view the old and painful remedy, the actual cautery, and if any of the means in use can succeed, this is the one. I have thought it useless to recount the numerous ridiculous remedies sometimes employed with this view, as I believe them perfectly inert. When the carious bone can be removed by an operation this ought to be performed, in order to expedite the cure. Portions of the tibia can very often be cut away by means of Hey's saw, and the crown of a trephine. Gouges and chisels are also in some cases necessary.

It is in general a very bad practice to inject corroding liquors into sinuses leading to carious bone, because they act much more powerfully on the soft parts in which the sinus is situated than on the bone, and therefore excite much unnecessary inflammation.

To attempt the healing of such sinuses before the bone is removed is always improper; on the contrary, the size of the external aperture should be enlarged with sponge tent if it become very much contracted.

The subject of caries, however, will be resumed in another chapter.

The difference of time required for the separation of caries in different bones is very great, and if a uniformity in the exfoliation of certain bones should be found to exist, a very valuable table might be formed exhibiting these periods. I have known a caries of the os calcis in which at the end of several years the separation was not completed; a few months suffices in general for the separation of the tibia in cases where the foot and ankle mortify.

CHAPTER LVI.

Ulcers attended with Varicose Veins.

THESE are a species of indolent ulcer, and resemble in appearance those which have been described. The most usual situation of ulcers in cases where the veins are varicose, is said by Mr. Home, to be on the inside of the leg, just above the ankle. They have their origin from accidental causes, but when once they occur they are difficult of cure and almost always break out again. Mr. Home adds that they occur most commonly in tall persons.

The branches of the saphena vein and indeed all the superficial veins of the leg are found in a varicose state, greatly distended, and the saphena itself is extremely large.

“This species of ulcer is seldom very deep; when it spreads it is generally along the surface; its shape is commonly oval pointing vertically. The edges of the surrounding skin are commonly neither thick nor irregular, but are imperceptibly lost in the ulcer. The pain which it gives is seldom from the surface, for pressure does not increase it, but there is an aching uneasy sensation in that part of the leg. This pain is deeper seated than the surface of the ulcer, and very often extends up the leg in the direction of the veins, and is increased to a very great degree if the limb is long kept in an erect posture.

“It is this species of ulcer which, from its great backwardness to heal, has given the idea of its being a natural drain from the constitution, which it was improper to dry up; and the strong argument advanced in favour of this opinion has been, that whenever it was healed, it broke

out again, and the patient was full as easy while the ulcer was open, as when it was closed, if not more. This may at first appear extraordinary, but can be readily explained; since the pain, in such cases, arises more from the distended state of the veins, than from the ulcer; and the patient will naturally be led to use more exercise when the ulcer is healed, which will keep the veins in a more uneasy state.

“This is the species of ulcer in which tight bandaging to the leg is particularly applicable, and rolling the whole limb from the toes to the knee, is found to be attended with the greatest advantage. It is to be understood that the tight bandaging is not immediately applicable to the ulcer itself, as it will appear that it is immaterial in what way the management of the ulcer is conducted, and it is probable that the success of tight bandaging in ulcers attended with varicose veins, has led to the use of compression in other species of ulcers, wherein it has proved hurtful; not being suited to the state of the limb, which often is unable to bear any thing tight upon it.

“Soldiers who have the slightest disposition to a varicose state of the veins, whether there is an ulcer on the leg or not, should have their gaiters so made as to answer the purpose of a tight bandage, which may be readily done by having them very accurately fitted to the leg; for this purpose those made of woollen cloth will answer best, as its elasticity allows it to yield to the motion of the muscles, and always preserves an uniform compression.

“A laced stocking is a most useful application, and if it could be worn without inconvenience, probably no other mode of treatment would be necessary; but it too often happens that the patient is unable to bear the neces-

sary degree of compression for any length of time, and therefore after using it for some weeks, is obliged to leave it off.

“In considering the mode by which the varicose veins prevent an ulcer from healing it appeared to be most readily accounted for in the following manner. That in consequence of the size of the vena saphena, and its numberless convolutions, the return of the blood from the smaller branches is so impeded, as to retard the circulation in the smaller arteries, and to interfere with their action in forming healthy granulations. This observation is, in some measure, confirmed by the following circumstance. In cases of ulcers attended with weakness, on the lower part of the leg, the granulations while the patient lies in an horizontal position, appear florid and healthy; but if he is made to stand up, and continues in that posture only for a few minutes, they become of a deep dark-red colour, and frequently bleed. This change can only arise from the increased resistance which the blood encounters in its return through the veins of the limb, when the body is erect.

“An enlargement of the veins produces also another effect. The coats of the vessels and the valves become thickened, which renders valves less pliant, they do not occupy the whole area, and therefore are no longer of any use; and from this defect the whole length of the column of blood in the vena saphena is in the erect position, pressing upon the contents of the smaller veins, so as to dilate them still more and more, and keep the limb always in a weak state.

“Under these circumstances, it appears to be an object of no small importance to take off a part of the pressure of this column of blood, which would probably allow the parts lower down to be in a more easy state, and better able to recover themselves; it might also prevent

the veins from being still more dilated, and so far stop the progress of the disease in these vessels.

“The only mode of doing this that suggested itself, was that of making an artificial valve, by passing a ligature round the vena saphena, as it passes over the knee joint, and obliterating the vein at that part. The reason for applying the ligature upon this particular portion of the vein is, that just at that part the branches from the different parts of the leg unite and form a common trunk, and as it is the preternatural enlargement of some, or all these branches, which constitutes the principal part of the disease, the most effectual mode of taking off the weight of the column of blood contained in the common trunk will be by obliterating it, as near as possible to the termination of those branches into it.” (HOME.)

Mr. Home accordingly performed the operation of tying up the saphena with a view to heal ulcers on the leg, in a variety of instances with complete success, and is the author of the practice; for although Mr. Hunter had previously tied up some veins in the leg, and also several very old surgeons, yet it was with very different views, and without any reference to this object. Dr. Physick has practised Mr. Home's operation in a number of cases, with various success; in some instances the ulcers have healed very rapidly, in others no benefit has apparently resulted. I have myself several times performed it, and always with advantage. In the hands of other surgeons it has proved in many cases beneficial, but in some instances the operation has been followed by death from tetanus, in others by inflammation of the internal coat of the vein—accidents which in America I believe have never succeeded this operation, and therefore in those cases where ulcers of the leg are evidently kept from healing by a varicose state of the limb,

I have no hesitation in recommending Mr. Home's operation.

“The operation for taking up the vena saphena is extremely simple, may be performed in a very short time, and is attended with less pain, if we may judge from the account of those on whom it has been performed, than it would be natural to expect. My attention has been directed in every case in which it has been performed, to render it as little painful as possible, and the mode which appears to me the least so is the following :

“As the veins are only turgid in the erect posture, the operation should be performed while the patient is standing; and if placed on a table, upon which there is a chair, the back of the chair will serve him to rest upon, and he will have the knee joint at a very convenient height for the surgeon. The leg to be operated upon, must stand with the inner ankle facing the light, which will expose very advantageously the enlarged vena saphena, passing over the side of the knee joint. While the patient is in this posture, if a fold of the skin which is very loose at this part, is pinched up transversely, and kept in that position by the finger and thumb of the surgeon on one side, and of an assistant on the other; this fold may be divided by a pointed scalpel pushed through it with the back of the knife towards the limb, to prevent the vein being wounded; much in the same way that the skin is divided in making an issue. This will expose the vein sufficiently, but there is commonly a thin membranous fascia, confining it in its situation: and when that is met with, the vein had better be laterally disengaged by the point of the knife. This is most expeditiously done by laying hold of the fascia with a pair of dissecting forceps, and dividing it; for it is difficult to cut upon parts which give little resistance, and there is a risk of wounding the vein. After this, a silver crook-

ed needle, with the point rounded off, will readily force its way through the cellular membrane connected with the vein, without any danger of wounding the vessel, and carry a ligature round it. This part, or indeed what may be considered the whole of the operation, being finished, the patient had better be put to bed, so as to allow the vein to be in its easiest state before the ligature is tied, and then a knot is to be made upon the vein; this gives some pain, but it is by no means severe. The edges of the wound in the skin are now to be brought together by sticking plaster, except where the ligature passes out, and a compress and bandage applied, so as to keep up a moderate degree of pressure upon the vein, both above and below the part included in the ligature. The inflammation, in general, is very trifling; it does, however, in particular cases, extend for some way in the course of the veins under the skin; but even where this has happened in the greatest extent, it has been attended with no bad consequences. The ligature comes away about the ninth or not later than the twelfth day, after which the parts commonly heal up. As it answers no good purpose for the ligature to remain so long, and only protracts the cure, I have been in the habit of removing it on the fifth day, which saves the patient five or six days of confinement. The mode of removing the ligature is very simple; the vein is so near the skin, that the knot is readily brought into view, and the ring of the ligature, which at the time of the operation was filled up by the vein, is now become loose, its contents having been considerably diminished by absorption, so that the point of a pair of scissors can be readily passed through it, by which it may with ease be divided, and the whole of the ligature brought away.

“Cases occur in which there is a smaller vein running parallel to the vena saphena. This, when the vena

saphena has been taken up, afterwards becomes enlarged, and continues the disease; when that is the case, this vein also must be taken up. These circumstances ought to be attended to in the first examination of the disease, as sometimes the two veins are so close together, that they may both be included in one ligature.

“This enlargement of the vena saphena is sometimes combined with an enlargement of the branches of the vena saphena minor or posterior, that passes up behind, between the two hamstrings; when this is the case, the disease is in an uncommon degree of violence, and in such instances would be less likely to be attended with success unless both venal trunks were taken up.

“In two or three cases, there has been an enlargement of the branches of the vena saphena minor, without the vena saphena itself being at all affected; the principal convolutions of the enlarged veins were on the calf of the leg, and on the outside of the foot, just below the outer ankle. In these instances there was no ulcer, and therefore no very forcible reason could be urged to induce the patients to undergo an operation, nor was there the same chance of success, the use of a laced stocking was therefore recommended; and in case that should not answer, it was explained to them, that they had it in their power afterwards to have recourse to taking up the venal trunk.

“The enlargement of the vena saphena minor, is rather mentioned as an uncommon occurrence, than as a case to be relieved by surgical treatment; that when it is met with, it may be distinguished from the vena saphena, the subject under consideration.

“In one case where there was an ulcer and only the branches of the vena saphena minor enlarged, the ulcer was situated more posteriorly than it is usually met with, and the branches upon the calf of the leg were in an extremely varicose state, forming large projections, the

trunk itself was very large, while the vena saphena was nearly of its natural size. The patient was a young woman of a very delicate constitution, but in good health: she was twenty-five years of age, and suffered so much pain in the ulcer, and in the course of the enlarged branches, as to be unable to walk or stand for any length of time, unless the limb was supported by a bandage.

“As instances occur, in which, though the immediate branches of the vena saphena are affected, the disease extends no further; and as the same thing happens, though less frequently, to the branches of the vena saphena minor; and in other cases, the disease is found to take place in both, it becomes necessary to explain in what manner complicated cases may be distinguished.

“The branches of the veins, passing up from the foot to form these two venal trunks, anastomose very frequently and freely with each other; it is therefore impossible to say precisely to which of them the collateral branches belong.

“When the vena saphena becomes enlarged, many of the common branches, and some of those belonging to the posterior trunk, will consequently be affected; and *vice versa*, when the vena saphena minor is enlarged. This, however, is not to be considered as implicating both veins in the disease, for the branches of one of them are only affected in a secondary way by their connection with the other. Whatever number of the venal branches of the lower part of the limb is enlarged, if this enlargement in those of the upper part of the leg only extends in the course of one of the venal trunks, the disease should be referred to that trunk, which ever it is, as it is evident that the other, from its remaining of the natural size, can have no part in the disease.” (HOME.)

CHAPTER LVII.

Ulcers attended with specific diseased actions.

THESE are exceedingly numerous, and under the present division may be included all ulcers from a local or constitutional action of a morbid nature ;—all scrofulous, venereal, and cancerous ulcers, and probably many others. A dissertation on these complaints is not at present necessary, but as a general rule it will be proper where the constitution is affected, to apply those remedies which may be indicated by the nature of the disease, and when the morbid action is local, if possible, the diseased parts should be totally removed by the knife or caustic, and a simple ulcer will then be left which can be readily healed.

I shall conclude by selecting from Mr. Home's valuable work on ulcers, some observations on the present subject.

I. OF THOSE ULCERS WHICH YIELD TO MERCURY.

“It is not meant as has been already stated to consider those ulcers that are connected with the venereal disease, but such only as are produced by other diseases of the general system, or of the parts which yield to the effects of this medicine.

“It was natural when the beneficial effects of mercury in the venereal disease were first discovered to suppose that every complaint which yielded to mercury must be venereal. It was, however, to be expected that observations accurately made would soon ascertain that this active medicine is capable of producing salutary effects in

many other diseases. Yet a long time elapsed before this was generally allowed.

“Even now when it is universally admitted that mercury employed through the medium of the system is the most efficacious medicine in inflammation of the liver, and in diseases of many other of the viscera, surgeons very unwillingly give it credit for the cure of ulcers that are not venereal, but are inclined to suppose every ulcer that yields to such treatment, arises from that disease.

“This is by no means true; for many ulcers unconnected with the venereal disease which received no benefit from other medicines shall heal under a mercurial course, or yield to mercurial applications. In some cases the ulcer has remained stationary during the use of the mercury, but as soon as it was left off has put on a more kindly appearance, the mercurial course having produced so great a change in the constitution as to destroy the disposition which had kept the ulcer from healing.

“Such ulcers are in general in their appearance allied to the indolent kind, but have some diseased disposition peculiar to themselves. Mercurial frictions are in these cases to be preferred, as it is a material object to impair the constitution as little as possible, by leaving the stomach undisturbed and in a condition to take nourishment.

“There are ulcers on the instep and foot with a very thickened edge, and a diseased state of the surrounding skin, approaching in their appearance to what is called elephantiasis; these are frequently met with in servants of opulent families, where they had led an indolent life and fed upon a luxurious diet. In cases of this kind, fumigations with the hydrargyrus sulphuratus ruber has healed the ulcers, and resolved in a great degree the swelling of the surrounding parts.

“The mercurial ointment made either by calomel and

hogs-lard, or the unguentum hydrargyri mitius mixed with camphor answers in some cases better than any other application.

“Camphor in general renders the mercury more active than when employed alone, and the mouth has been frequently known to be affected by an application of this kind to a small surface, when the mercurial ointment, applied to a much larger extent, has produced no such effect.

“The hydrargyrus muriatus, diluted with water, (to which a small portion of spirit has been added) in the proportion of a grain to an ounce, is a very useful application to many ulcers with a diseased aspect, more particularly those that are superficial, with a thickened edge, and appear to be principally confined to the skin.”

II. OF ULCERS WHICH YIELD TO THE USE OF THE DIFFERENT PREPARATIONS OF THE CONIUM MACULATUM, OR HEMLOCK.

“The inspissated juice of the conium maculatum, internally employed, is by some practitioners supposed to be entirely inert; while by others it is believed to have considerable powers over many diseases. From these opinions, so diametrically opposite, and both taken from actual observation, it would seem that its effects are very precarious. I confess myself by no means warm in its favour; for though it is sometimes of service in local complaints, it has so often failed, that much reliance cannot be placed upon it as an internal medicine, in diseases connected with surgery.

“As an external application, the conium maculatum is a much more certain medicine, and I do not hesitate to declare myself convinced, that there are cases of diseased ulcers on the legs which are cured by it more readily than by other means.

“The ulcers which are most generally benefited by

it, from their appearance, would be classed with the irritable; but there is in the surrounding parts a degree of thickening, which must be attributed to some specific diseased action. These ulcers are met with in the neighbourhood of the ankle joint, and the joint itself is enlarged. They sometimes occur upon the ligaments of the joint of the knee, but less frequently. From their situation and the enlargement of the joint, they may be supposed to be scrofulous; but from their sensibility they must be considered as an uncommon variety, if they really belong to that disease. In such diseased ulcers the conium maculatum takes off the pain, reduces the swelling of the joint, and seems to counteract the diseased disposition, whatever may be its nature.

“In many ulcers that are truly scrofulous, the external applications of the conium maculatum are productive of the greatest advantage, particularly in those attended with irritability.

“The conium maculatum admits of being employed in three different forms, but only two of them are in general use.

“The decoction is used as a fomentation, which is a very advantageous from, in those cases that are attended with pain; since the warmth assists in soothing and alleviating the symptoms.

“It is used in the form of poultice, which has an advantage, as it admits of being much longer continued to the ulcer. The decoction of which the poultice is made, should be much stronger than is commonly directed. Eight bundles, or four handfuls, of the dried herb, and a greater quantity of fresh leaves in proportion, should be boiled in a quart of water, to a pint. A poultice made with a weak decoction has frequently been used without the smallest benefit; but when the strength of the decoction was increased, the ulcer shewed evident signs of

amendment. Where the weight of the poultice is oppressive to the limb, the decoction may be applied upon lint to the ulcer.

“The inspissated juice of the *conium maculatum* admits readily of being formed into an ointment; but although several trials have been made with it, the results were not in its favour as an external application.”

OF ULCERS WHICH YIELD TO THE APPLICATION OF SALT WATER.

“Salt water is an exceedingly good application in many scrofulous ulcers, some of them being more readily cured by it, than by other applications. The form of poultice is most commonly employed; but in many cases of ulcers on the legs, keeping the part immersed in tepid salt water, for fifteen minutes, twice a day, appears to be preferable to any other mode. Several small ulcers have got well under this treatment in a fortnight which had resisted the effects of internal medicines, and many different external applications, for six months; nor did the ulcers return afterwards in the course of several years. The same mode has been used with large ulcers, and frequently with success. In scrofulous ulcers on the legs and feet, the salt water poultice sometimes brings out pimples on the skin, so that the application cannot be continued. When this is the case, adding equal parts of decoction of poppies takes off this unpleasant effect; and after the skin has been for some time accustomed to the salt water in a diluted state, it will bear the salt water by itself.

“In such cases the foot or leg at the times the poultice is to be changed will receive benefit by being immersed for ten minutes in tepid salt water.

“In some superficial ulcers attended with a thicken-

ing of the skin, that have been in that state for months, the application of tepid salt water has produced a cure.

“When there is an unusual coldness in the limb, without any tendency to mortification, the tepid salt water may be used with great advantage; it brings a glow upon the skin, and rouses up the actions of the parts, so as to give an ulcer, which had for some time been in an inactive state, a disposition to heal. These cases occur in tall thin men who are unhealthy, and advanced in life. They are also met with in young women, who are very weak and unhealthy; the whole system in such cases is apparently defective, not having sufficient energy to do more than carry on the functions of life, and being therefore unable to support the effects of disease.

“Where the leg has a tendency to become anasarcaous, the application of tepid salt water is sometimes found entirely to remove that disposition.”

OF ULCERS WHICH YIELD TO THE USE OF THE ARGENTUM NITRATUM.

“There is a species of ulcer which does not appear to go deeper than the cutis, but spreads in all directions, producing ulceration on the surface of the skin, and frequently extends in depth its whole thickness, or nearly so. This diseased disposition, whatever it is, does not remain in the parts that have ulcerated, but only on the edge of the skin, where the ulcer is increasing, for the surface first affected heals, while the skin beyond it is in a state of ulceration.

“This description applies nearly equally well to the ulcers produced by three separate diseases, to all of which the soldier is peculiarly liable. One is a leprous eruption, most commonly met with among the impressed men brought from Ireland. Another is the consequence of buboes, which from their long continuance after the ve-

nereal virus has been destroyed, dispose the skin to take on this disease. The third is a disease of warm climates, commonly called the ring-worm. All of these as far as my experience enables me to form an opinion, yield more readily to the solution of the *argentum nitratum* applied to them in different proportions, than to any other local treatment.

“The disease met with among the Irish recruits is evidently of the leprous kind, as it is communicated by infection; and in those instances that have come under my care, was received by lying in bed with persons affected by it. Under these circumstances, a vulgar prejudice of its only affecting parts similar to those that had the disease, is very readily explained, for such similar parts in bed are the most likely to come into contact with each other.

“It affects in general the breast, back, and legs; it shows itself by a swelling like a large boil, with a pale red margin, extending for some way all round; a reddish black scale forms on the top, the boil becomes extremely painful and itches; the scales fall off exposing a foul ulcer, which discharges a fetid limpid fluid, and excoriates the surrounding skin, producing ulceration wherever it comes in contact: in this way it spreads over the greater part of the limb, and in some instances over a considerable portion of the body; the parts first affected healing, while the disease is extending to those beyond. These ulcers remain open, three, four or even six months, and then heal up leaving a cicatrix similar to that which remains after the small pox; these cicatrices often break out again in the spring in the same way that the disease first began, by forming a boil, which becomes an ulcer and spreads as it did before. In the very hot weather the pain and quantity of the discharge are the greatest; so that in the month of June the disease is the most virulent and in the autumn subsides.

“The symptoms are aggravated by the use of spirituous liquors, by feeding on salt provisions, and catching cold; under any of these circumstances the ulcers are more inflamed and the pain more violent.

“A number of cases of this kind came under my care in the year 1778 at the naval hospital at Plymouth, being brought from Ireland, among the men impressed for the use of the navy. Mild applications did not answer; more stimulating medicines gave relief; and the solution of the *argentum nitratum* appeared upon the whole to be the best adapted to this disease.

The disease in the skin produced by the effects of very irritable buboes, in constitutions broken down by mercury, is very similar in its progress to that which has been described; it is, however, more violent, the ulceration going deeper than the skin, which makes it more painful; it spreads in some cases down the greater part of the thigh, and upwards almost around the body. The new skin which forms is readily disposed to ulceration, and the parts break out again very commonly in the spring. The discharge is of a thin acrid kind; and as it excoriates the surrounding skin, there is little doubt but it would affect the skin of another person.

“In several cases of this kind, a variety of applications have been tried, but none of them agreed with the skin so well as the *argentum nitratum*; all preparations of mercury did harm; no unctuous application answered, so that it was always necessary to return to the *argentum nitratum*; and by steadily persevering in its use, even in the worst of them, a cure was nearly effected, after a continuance of the disease for nine months previous to its being applied.

“The ring-worm is considered as a disease of warm climates; and in the stage where an ulcer is formed, it certainly is confined to hot countries; it is, however, met

with in a less degree in the warm season in England. It is supposed to be infectious, and always to be caught in that way; that it is so generally, there can be no doubt, but it also arises very commonly without any infection: this however, probably happens where the skin is very readily affected by the disease. That infection is not necessary for the production of the ring-worm, is proved by the following instances where it arose spontaneously.

“In the summer 1779, while at Plymouth, I was consulted by an officer in the 75th regiment, at the desire of Mr. Venven, who was then surgeon of it, for a complaint on the skin of the upper part of the thigh, which appeared an uncommon disease, and did not yield to any applications that were made to it. I felt myself equally at a loss in what view to consider it; mercury was used in different forms, but without any good effect, and in the autumn it very gradually went off.

“About a year after seeing this case, I embarked for the West Indies, and as soon as the ship had got within the tropics, found myself more oppressed and irritated by the heat than most of the Europeans on board, and to my astonishment found a similar complaint had taken place to that under which the officer had laboured, at Plymouth. To allay the extreme pain and itching it produced, cold water was frequently applied to the part, which kept it very cool; under this treatment it went off, but not for several weeks. Upon my arrival in the West Indies, the disease returned, and was ascertained to be the ring-worm, so common in that country, which it was impossible for me or the officer of the 75th regiment at Plymouth to have received by infection.

“The RING-WORM begins with an efflorescence on the skin, a little raised above the natural level, which spreads from a centre; when the disease increases in

violence, the margin of the circle is raised into a welt, and the surface contained in it appears scurfy; the welt becomes covered with a scab which falls off, exposing an ulcerated ring, commonly not more than a quarter of an inch broad; the ulceration spreads outwardly, and heals towards the centre; so that in general the breadth of the ulceration is nearly the same, although the circle is becoming larger and larger. It seldom becomes of any depth, being entirely confined to the cutis; but in the worst cases it appears to extend through its whole thickness. In this stage it must be classed among the diseased ulcers, and among those of a very distressing kind, as the painful symptoms are very violent. The discharge is not pus, but a thin watery fluid, of a very acrid nature, which by its virulent properties, most probably extends the disease along the skin.

“In the East Indies the application in use to it, in this stage, is vinegar saturated with borax. The natives employ the juice of some plants, which is sold as a secret medicine; it is made by a Hindoo doctor at Vizagapatam, and sold at the different presidencies in India. This medicine is of a very acrid nature, giving the patient excruciating pain, but removes the disease in a very short time.

“The solution of the *argentum nitratum* answers in the milder cases, and there is little doubt of its being equally successful in those that are more severe.”

OF ULCERS THAT YIELD TO THE USE OF ARSENIC.

“Arsenic has been applied externally in cases of cancer, by a number of empirics, as a caustic; but from the violence of its effects, regular practitioners have in general been afraid to employ it in cases of surgery. It is, however, a medicine that may be used with safety, both internally and externally, in many diseased ulcers, with the greatest advantage.

“Those ulcers in which I have been led to employ it, are named from the virulence of their disposition, *noli me tangere* ; and are very nearly allied to cancer : differing from it in not contaminating the neighbouring parts by absorption, but only spreading by immediate contact.

“Ulcers of this kind differ exceedingly from one another in their degree of virulence ; but they are all so far of the same nature, that arsenic in general agrees with them, and puts a stop to their progress, while they are aggravated by milder dressings.

“I have been in the habit, for many years, of using arsenic externally to such ulcers, and its effects encouraged me to continue this practice ; but did not authorize giving it internally with this view, lest the quantity necessary to be of any service might prove hurtful to the coats of the stomach. I was, however, induced to try it some years ago in St. George’s hospital, in the following case, in which nothing could be well applied to the part itself.

“A woman, sixty-five years of age, came into St. George’s hospital on the 15th of June, 1796, with an ulcer on the side of the tongue, of three months continuance. It was foul, and was spreading backwards to the root of the tongue, was extremely painful, and the ulcer had an offensive smell. It was out of the reach of external application. Finding no advantage from the use of the extract of the *conium maculatum*, which was given in large doses, it was thought right to try the solution of white arsenic in boiling water. She took at bed time five drops for a dose ; this made her very sick : next night three drops were given, which did not disturb her stomach ; this dose was continued for four successive nights, and as the stomach was very quiet, the number of drops was again increased to five, which were now found

to agree very well. The ulcer was evidently better, and at the end of three weeks from the time the arsenic was given, was much diminished in size. The dose was increased to six drops, and in a fortnight more the ulcer was completely healed. The arsenic in this case could not act locally, as the ulcer was not situated upon a part of the tongue to which it could apply itself in the act of swallowing, and if it had, the time of application must have been too short to produce much effect.

“The success attending this case induced me to try the internal use of arsenic for an ulcer upon the side of the nose of a young woman, which had much the appearance of the *noli me tangere*. Nothing was externally applied, the whole treatment consisted in the internal use of arsenic, and in the course of a few weeks the nose was nearly healed.

“These not being cases of ulcers on the legs, may be considered as foreign to the present subject; but they are here introduced with a view to justify the internal use of arsenic in those ulcers on the leg, which receive benefit from its external application; since they show, in the most unequivocal manner, that such practice is in itself not only safe, but capable of being attended with great advantage.

“To ulcers of an untoward appearance on the legs, arsenic may be used both internally and externally, with success.

“The cases to which this treatment is peculiarly applicable, are those of the fungated ulcer. They are met with in the calf of the leg, and on the sole of the foot, shooting out a fungus from the surface, which is entirely different from common granulations: the new formed substance is radiated from its structure, the bottom of the ulcer being the central point, and the external surface (which is always increasing) the circumference. This

fungus is very tender in its substance, and bleeds if the slightest violence is committed on it. This disease in its origin sometimes appears like a scrofulous affection of the metatarsal bones of the foot; but the enlargement of the parts exceeds what commonly is met with in scrofula, ulceration takes place upon the skin, and a fungus shoots out, showing, for the first time, the nature, of the disease. Whether such cases are originally scrofulous, and afterwards assume the new diseased disposition, it is difficult to determine; but their remaining for a year before the fungus shows itself, renders it highly probable. The same disease takes place in the testicle.

“There appear to be two kinds of this disease; one which is poisonous, and capable of contaminating the lymphatic glands in the course of absorption; the other not. There is no mode by which these two species can be distinguished in their earlier stages; and the first kind is not to be removed by this or any other application, at present known: it is therefore only in the second kind that the arsenic is capable of effecting a cure. This medicine should however, be used in all cases not ascertained to be poisonous.

“The solution of arsenic, which I have always used, is made by boiling white arsenic in water for several hours in a sand heat, and taking this saturated solution for use. When given internally the dose is from three drops to ten, when externally applied, a drachm is diluted with lb. ij of water; and the solution is gradually made stronger, as the parts become accustomed to it, till it is of double strength. This solution is either applied on lint, or made into a poultice.

“In ulcers connected with diseased bone, which prevents them from healing, the luxuriant granulations rise up round the orifice leading to the bone, and require being destroyed by some escharotic; the solution of arse-

nic answers this purpose better than any of those in common use.” (HOME.)

In the treatment of ulcers attended with specific action, as in all others *the state of the system* must be always kept in view. If an inflammatory disposition be manifested, the remedies for inflammation must be administered; if, on the contrary, great debility prevail, an invigorating diet and tonics are to be directed. The influence of the general health upon *all ulcers* is very great; an epidemic will sometimes occasion every ulcer in a large hospital to “wear its livery,” and until this morbid diathesis is removed, the ulcers cannot be cured. The surgeon should therefore never lose sight of the *state of the system*.

CHAPTER LVIII.

Of Caries.

HAVING treated of ulcers in the soft parts we proceed to speak of caries, which consists in ulceration of a bone, and is analogous to the same process in soft parts, the action of the absorbents being essential in both cases.

Every bone in the body is occasionally affected with caries; the spongy bones, however, more frequently than the rest; the bones of the tarsus and carpus, the sternum, and the vertebræ are most liable to caries, and when it attacks the long bones, their spongy extremities are generally affected. The bones in early age are more liable to caries than in advanced life.

The substance of a bone affected with caries becomes soft, so that a probe may readily be forced into it. Fungous flesh forms around it, which is exceedingly vascular and bleeds whenever it is touched. A serous discharge takes place, of a black colour and offensive smell. Caries differs from necrosis as ulcer differs from gangrene. In caries there is action, and the absorbents remove the diseased bone; in necrosis the bone is dead, and the absorbents of the neighbouring living bone detach it, as a slough or eschar is detached in the soft parts.

Caries is produced by a great variety of causes; it seldom, however, results from external violence, because a blow on a bone, if sufficiently forcible, occasions necrosis; but caries sometimes results from blows, and according to Boyer it is produced by an extravasation of blood into the cells of the bone, and the inability of the absorbents to remove the effused blood which occasions ulceration or caries.

“Abscesses are said to occasion sometimes a caries of the bones, over which they take place; and we are told, that the existence of the morbid state of the bone may be ascertained by introducing a probe to the bottom of the abscess.

“Conformably to this theory, it has been laid down as a rule, that abscesses situated over bones should be opened at an early period, in order to prevent any disorder of the bone or periosteum from the stagnation of the purulent matter. But if abscesses formed over certain bones, as, for instance, over the anterior face of the tibia, or mastoid process of the temporal bone, be frequently accompanied with caries, the latter is the cause, and not a consequence of the abscess. Pus, which is a bland, unctuous, and inodorous fluid, never attacks the soft parts with which it is in contact, until its qualities are changed by exposure to the air. When an abscess forms in the anterior parietes of the abdomen, the peritoneum naturally a thin membrane, instead of being corroded, becomes thick and strong enough to resist the effusion of the pus into the cavity of the abdomen. The periosteum becomes thickened in similar circumstances, when the abscess is a consequence of an external injury. We may conclude, then, that caries is seldom produced by an external cause; and that most frequently a blow or external injury, when followed by that disease, has acted only as an exciting cause, a disposition to it having pre-existed. There is every reason to believe that it may be ascribed in almost all cases to a disease of the system, such as scrofula, lues, scurvy, or even cancer.

“Scurvy diminishes the energy of the contractile fibre, and diffuses a principle of dissolution in the solids and fluids. The blood rendered more fluid by it than natural, oozes through the pores of its small vessels: spots or ecchymoses manifest themselves, first in the

parts in which circulation is most languid, as on the hands and feet: the muscles become soft and painful; the gums swell, and separate from the alveolar process: the periosteum may become tumefied in like manner, and lose its connexion with the bone affected with caries.

“Scrofula attacks the spongy part of bones and the lymphatic system. A caries from this cause is very frequent in the tarsus, carpus, elbow, and knee; but it is always preceded by a white swelling.

“The venereal disease is sometimes a cause of caries, though its action on the osseous system more generally produces necrosis or exostosis. However, when it attacks the bones of the nose, it produces a caries of them, by which they are consumed, and the face sadly disfigured. The bones of the palate are sometimes destroyed in the same manner, and by the same cause.

“In cancers of the mammæ, the sides of the sternum are often found carious; which proves that cancerous ulcers may, as well as the preceding diseases, occasion a caries of the bones in their neighbourhood.

“Nothing can be easier than to ascertain the existence of a superficial caries; and when the affected bone is deep-seated, it may be discovered by introducing a probe; for if the bone be carious, the probe may be easily forced into its substance. But bones which we cannot readily come at may be carious, in which case the diagnosis is somewhat more difficult; however, if a fistula, from which a fetid blackish matter flows, be directed towards a bone, and if the surrounding soft parts be at the same time turgid and indurated, there is every reason to apprehend a caries. The black colour of the discharge is, however, equivocal; because, as remarked by Ambrose Paré, it may be occasioned by a bit of agaric or other foreign body introduced into the wound. It will be prudent, therefore, in dubious cases, to trust chiefly to the history of the disease.

“If a persons affected with a certain constitutional disease, feel deep-seated and acute pains in any of his bones ; and if the pained part swell and become the seat of an abscess, from which a purulent matter of a bad quality flows, there is every reason to believe that the bone affected with pain is carious. Inert abscesses are attended with nearly the same symptoms, with this difference, that they are not preceded by pain. Caries occasioned by syphilis affects most commonly the tibia, os frontis, ossa nasi, ossa palati, and sternum. Whenever, therefore, any of these bones become carious, whilst the person labours under syphilis, there is just ground for concluding that the caries is a symptom of the venereal affection.

“A caries of the vertebræ is known by peculiar symptoms, among which a paralysis of the inferior extremities, and the formation of abscesses in the groin, verge of the anus, or lumbar region, are the most remarkable.

“The prognosis is more unfavourable in cases of caries of spongy bones, than in those of a similar affection of compact ones, thus there is not so much to be apprehended when the bones of the cranium or the scapulæ are affected, as when the extremities of long bones are similarly diseased. Caries of the bones of the carpus and tarsus is also very dangerous. The evil, on account of these bones being in such close contact, extends from one to the other; and when one of them becomes carious, it is very difficult to stop the progress of the disease without amputating the limb.

“This operation is often the only resource in our power against caries of short bones, or of the extremities of long ones ; and we are even deprived of this when the bone affected with it is deep-seated: thus caries of the head of the femur, or of the cotyloid cavity, cannot be remedied by this operation. The same may be said

of caries of the spine, also named gibbosity, in which, as well as in the preceding case, our treatment must be merely palliative.*

“Caries from an external cause is less dangerous as well as less frequent than that from an internal; and that resulting from an internal disposition is much more dangerous when it proceeds from a scrofulous or cancerous diathesis, than from a venereal or scorbutic; for some efficacious remedies against the latter are known; but cancer and scrofula resist all the remedies with which we are as yet acquainted. It is also more dangerous to old than to young persons, not that its progress is not more rapid in the latter, as already mentioned, but because nature is more capable of limiting its ravages in youth than in old age. Finally, the prognosis is further influenced by the extent of the disease, the patient's strength, and state of the neighbouring soft parts.” (BOYER.)

TREATMENT.

In the treatment of caries much depends on the source or cause of the disease. If any peculiar morbid affection of the system exist, this must be previously remedied. If the venereal disease have produced the affection, mercury must be administered. The caries, however, which results from the venereal disease, is by no means to be considered as indicative of the presence of venereal action, because, after the bone has become carious, it is possible for the venereal action to be completely removed by the use of mercury without an immediate separation of the bone. It is to be remarked here, however, that although *caries* sometimes results from the venereal disease, yet, it oftener happens, that portions of bone are completely killed, and exfoliate in con-

* Not always: there is reason to believe it sometimes cured. See the Chapter on “Curved Spine.”

siderable masses after the venereal disease is cured. It is no uncommon thing to find the ossa spongiosa coming away almost entire; large portions of the alveolar process of the upper jaw, the vomer, and other masses of bone, are often detached by the absorbent vessels, in consequence of venereal affections which have been previously cured by the administration of mercury.

To remove the diseased action of the system, which had produced the caries appears in such cases to be all that is necessary, the parts readily heal when this is done, "*Causa sublata tollitur effectus.*" As I shall not enter on the treatment of the venereal disease on the present occasion I refer to Dr. Adams' excellent edition of Mr. Hunter's treatise on that subject in which the proper mode of administering mercury is most judiciously detailed. The time necessary for the separation of portions of bone which have been destroyed by syphilis, varies considerably, and is sometimes extremely tedious.

If the caries have arisen from scurvy, the remedies for this disease are to be administered. A vegetable diet with acid drinks are to be prescribed.

Where the disease, however, is local, local remedies are to be applied. It is an important principle in the treatment of certain ulcers, to destroy the life of the diseased parts, so that an eschar may be formed, and when the eschar separates, a common healthy sore may be left. In like manner a carious bone may often be treated with advantage. Lunar caustic is to be applied with this view to the carious part, by which it will be reduced to the state of a necrosis or mortified bone, which will be detached by the action of the absorbents, and the healthy bone left underneath in general granulates and heals.

The French surgeons in many cases, especially in what they denominate a humid caries, which is attended

with a copious serous discharge, prefer the actual cautery to the lunar or vegetable caustic. The following remarks from Boyer on its use are entitled to great attention. "This remedy is applicable to every case of humid caries where the surrounding soft parts have not a manifest tendency to cancer. Sometimes, however, the soft parts surrounding a carious bone have that tendency in so advanced a degree, that the actual cautery would necessarily occasion the developement of that morbid state. The general rules to which the use of the actual cautery may be reduced are as follow :

"In the first place, all the carious part of the bone must be laid bare, whether by cutting away the soft parts, or destroying them by caustic. The latter method being tedious, inconvenient, and uncertain, should not be used unless when the patient will not submit to the knife. The bone being in this manner laid bare and scraped, the surgeon provides himself with several cauterizing irons of the same form, because the application of one is seldom sufficient. It will also be necessary to provide a number of canulæ when the cautery is to be applied on a bone from about which the soft parts cannot be completely raised ; as, for instance, on the os coccygis, or sacrum : by means of these canulæ, the hot iron can be introduced without injuring the soft parts. In every case it will be necessary to protect the surrounding parts as much as possible from the action of the cautery.

"The iron, whatever may be its size, should be heated white, as the hotter it is, the more rapid and less painful is its action. On the instant of its application, a black thick smoke rises from the surface of the burning bone, the smell of which resembles exactly that of burning horn : the great quantity of sanies quickly diminishes the heat ; for which reason a second is to be immediately applied with the same precautions ; and a third, if the

two preceding have not burned deep enough. Care should be taken to extirpate the disease by burning every part that is affected; and if the use of the cautery has not always had the success expected from it, the failure of it is to be attributed to the timidity of the operator. A carious bone becomes worse by the application of the actual cautery, if the evil be not entirely rooted out, just as a cancerous tumour becomes irritated, and makes a more rapid progress, if imperfectly cauterized.

“The actual cautery acts by evaporating the noxious fluids in which the carious bone was immersed; by changing the caries into necrosis, and by irritating the subjacent sound parts, and exciting that action of the vessels by which the dead part of the bone must be thrown off.”

The particular situation of a bone often influences the treatment necessary. The skull sometimes becomes carious in consequence of the venereal disease, and here the actual cautery cannot be applied. The trepan is therefore to be used, and with it the diseased or dead bone is to be removed. Boyer recommends, however, the application of the hot iron, when the mastoid process of the temporal bone is the part affected, because the thickness of its substance is sufficient to protect the brain from the effects of the heat.

The bones of the face are not often affected with caries, except from scurvy or syphilis, and the constitutional remedies for these diseases generally effect a cure.

Caries of the vertebræ has already been particularly noticed.

A caries of the sternum is not unfrequent. The affected bone should, if possible, be removed by means of a trephine, or cutting instruments. The internal mammary artery should be carefully avoided in the operation, although it could probably be secured if wounded. After

trepanning the sternum, the pleura beneath it is found to thicken and gradually becomes hard and cartilaginous, supplying in some measure the deficient bone. Boyer recommends after the wound is completely healed, the application of firm leather or pasteboard, over the aperture for the purpose of defending the contents of the thorax from accidents. He adds, "if the carious part cannot be totally removed, it will be necessary to make two perforations in the lower part of the sternum in order to give a free passage to the purulent matter. Though the disease will not be radically removed by this means, yet the sufferings of the patient will be considerably alleviated."

In the other bones, especially in those of the extremities, the carious part, when practicable, should be removed by means of a trephine or Hey's saw, together with chisels, gouges and knives; but if this cannot be done, the caustic, or hot iron, should be used. Large portions of carious bone have been removed by these instruments in a variety of cases, with the effect of producing a speedy cure.

CHAPTER LIX.

Of Necrosis.

NECROSIS as has already been mentioned, denotes the entire death of a bone or part of a bone.

All the bones are occasionally affected by necrosis. The affection may be partial or total. It may be superficial or extend through the whole thickness of the bone.

“The middle portion of long bones, or that part of them which is most compact, least porous, and consequently least endued with the vital principle, is that which necrosis most generally attacks. The extremities of these bones, and in general, all spongy bones are much less liable to it. It never extends to the articulations even when the whole diameter of the middle part of the bone is affected by it. The extremities covered with cartilage separate from the dead part of the bone, and if this be removed by nature or art, they unite with the ossified periosteum which occupies the place of the separated portion.

“When the necrosis is superficial, the superior lamellæ are separated from the rest of the bone; but this separation is always preceded by a suppuration produced by the irritation given to the surrounding soft parts by the dead portion of bone. It is to be observed, that no part of the substance of the dead portion of bone goes to the formation of this purulent matter; for it seems to be not only incapable of furnishing matter for formation of pus, but is entirely without the sphere of vital action.

“If a broad bone as the os frontis, for instance, be attacked, the skin over the affected parts tumefies, be-

comes inflamed, and assumes a brown or violet colour; it grows gradually thinner, bursts at length, and gives issue to the purulent matter contained under it. The necrosis of the bone is then ascertained by introducing a probe, which is found to pass on a rough and naked surface, if the affection of the bone really exist.

“In a case of complete necrosis of a long bone, the limb swells at the part affected, and a hard tumour is formed on it. Abscesses form at various points, they burst, and their openings degenerate into fistulæ. The discharge from these in the commencement is white and inodorous, but becomes serous and fetid in a short time. This matter is sometimes absorbed in such quantity as to produce marasmus, hectic fever, &c. In cases of necrosis, in which the whole bone is affected, the periosteum separates from the portion of diseased bone, its vessels seem to take on a new action, a calcareous phosphate is deposited in its texture, it acquires hardness, and in time forms a cylinder, in which the dead part of the bone is included. This new bone, which is in fact the periosteum ossified, is rough on its surface, and has but a distant resemblance to that which it replaces. Various holes are observed in it, through which the purulent matter and mouldering portions of bone escape, the fistulous openings in the soft parts being continuations of these holes, and the muscles of the limbs are inserted into it.

“The dead part, completely separated from the sound, and enclosed by the indurated periosteum, is called the *sequestrum*: this separation is perfectly analogous to that of mortified soft parts.

“The promptitude with which gangrened soft parts are separated, is much greater than that with which a dead portion of bone is detached; but this difference is to be entirely attributed to the state of the vital energy of

the parts, which is much more considerable in the one case than in the other."

The causes of necrosis are various accidents by which the texture of a bone is destroyed, as blows, pressure, &c. and also certain diseases, as syphilis, scrofula, &c. indeed it is difficult to distinguish, when caries, and when necrosis have resulted from these constitutional affections; and it is unnecessary to add to what has been said of their effects in the last chapter.

Some of the most interesting operations of the animal economy are called forth by necrosis. The manner in which new bone is formed to supply that which has been lost, has of late years excited great attention, and appears at present to be well understood.

It frequently happens that the firmness of a limb remains during the whole of the process by which the new bone is formed; it would appear from the observations of Mr. Russell, that the old bone serves as a mould upon which the new bone is formed, and the new bone not only begins to grow, but actually acquires solidity and firmness before the dead bone is absorbed and removed; I have before me at this time a very curious specimen of new bone, investing completely in a hollow cylinder a portion of carious tibia, an aperture remaining in front nearly large enough to permit the extraction of the old bone. And a case is recorded in which seven inches of the thigh bone was pulled away from within a similar bony production in a boy thirteen years old. In some cases a complete new clavicle has been formed, the old one being separated, and large portions of the lower jaw bone have been regenerated after being destroyed by necrosis.

If the new bone were not formed previously to the separation of the old, the limb would become flexible at the diseased part.

It has already been remarked that necrosis generally happens in the middle of the cylindrical bones, and that the articulating extremities remain sound. From these extremities the formation of new bone progresses upon the old, forming a case around it, larger in diameter, of course, than the old bone, but never exceeding it in length. This bony involucrum is at first a soft pulpy mass, and Mr. Russell supposes it formed independently of the original bone, or its periosteum. Mr. Macartney opposes this idea, and in a letter published by Mr. Crowther, remarks, "that the first and most important circumstance is the change which takes place in the organization of the periosteum; this membrane acquires the highest degree of vascularity, becomes considerably thickened, soft, spongy, and loosely adherent to the bone. The cellular substance, also, which is immediately connected with the periosteum, suffers a similar alteration: it puts on the appearance of being inflamed, its vessels enlarge, lymph is shed into its interstices, and it becomes consolidated with the periosteum. These changes are preparatory to the absorption of the old bone, and the secretion of new osseous matter, and even previous to the death of the bone, which is to be removed. In one instance, I found the periosteum vascular and pulpy, when the only affection was a small abscess of the medulla, the bone still retaining its connection with the neighbouring parts, as it readily received injection. The newly organized periosteum, &c. separates entirely from the bone, after which it begins to remove the latter by absorption;" and, while this is going on, its inner surface becomes covered with little eminences, resembling granulations. "In proportion as the old bone is removed, new osseous matter is dispersed in the substance of the granulations, whilst they continue to grow upon the old bone, until the whole, or a part of it, is completely absorbed, accord-

ing to the circumstances of the case. What remains of the investment, after the absorption of the old bone, and the formation of the osseous tube, which is to replace it, degenerates, loses its vascularity, and appears like a lacerated membrane. I have never had an opportunity of examining a limb, a sufficient time after the termination of the disease, to ascertain, whether the investment be at last totally absorbed; but, in some instances, I have seen very little remaining. During the progress of the disease, the thickened cellular substance which surrounded the original periosteum, becomes gradually thinner, its vessels diminish, and it adheres strictly to the new formed bone, to which it ultimately serves as a periosteum."

The symptoms of necrosis have been well described by Russell. In an incipient state, it is characterized by a deep-seated excruciating pain, not at first aggravated by pressure, and which is soon followed by a rapid enlargement of the parts along the course of the bone. Soon, however, after the commencement of the attack, an external inflammation succeeds, which quickly ends in the formation of matter. The abscess, at length, bursts by a small opening. The extent of this inflammation is not in general great. Most commonly several inflammations, of a circumscribed kind, occur about the same time, the abscesses burst by small openings, which do not close, but continue discharging matter as fistulous sores. The apertures are generally situated over the most superficial part of the affected bone. The pus is usually of good quality, and large in quantity, issuing from extensive cavities, into which the fistulæ lead. Such abscesses, being situated within the newly formed osseous shell, cannot be discharged by pressure, nor can any fluctuation be felt. A probe can seldom be introduced far into the fistulous openings, or discover any loose piece

of bone. In this stage, the dead bone, technically called the *sequestrum*, can seldom be felt, though, in a few instances, small spiculæ make their way outward, together with the discharge. Fistulous openings may be regarded as necessarily attendant on all cases of necrosis; though so mild a case may be conceived, that the new bone may be generated without any outward ulcerations. No such instance, however, is on record."

After the openings have formed, the case may take one of the two following courses. The ulcerations may in time heal up, the sequestrum never be seen, and no vestige of the disease remain, except a permanent enlargement and induration along the course of the bone,—this is the most favourable manner, in which a necrosis can terminate; or secondly, the sequestrum may make its appearance externally, through the new bone and the integuments, attended with degrees of pain, inflammation, and suppuration, differing in different cases. The sequestrum may at first be moved by shaking it; but is too firmly wedged in the surrounding parts to be completely taken out. In time, however, it becomes loose enough to be removed.

Sometimes, the middle portion of the sequestrum presents itself externally, while its sides are every where wedged in the substance of the new bone. The natural end of such a case would be very tedious of accomplishment, and the interference of art is essentially serviceable in accelerating the separation of the dead bone, thus circumstanced. After the sequestrum has been either absorbed or thrown off, in one of the above ways, the cavity of the new bone becomes filled up with granulations, which are, at length, converted into bony matter. Thus the new bone differs from the original one, in being solid instead of hollow.

"When the sequestrum is thrown off slowly, the in-

flammation is moderate ; but, when it separates quickly, while the new bone is in a soft state, the detachment is always preceded by severe inflammatory symptoms, and followed by a temporary loss of the natural firmness of the limb. This premature separation of the sequestrum often occurs in necrosis of the lower jaw, and the chin consequently falls down on the neck. In certain cases, the sequestrum separates at each end from the living portions of the old bone, before the new osseous shell has acquired firmness, so that the limb feels as if it were broken in two places.

“When the dead bone is removed by absorption, the process is tedious, and attended with a profuse discharge of matter, which gradually ceases, and at last stops altogether. In young subjects, this work is more quickly perfected, than in old ones. There are some chronic cases of necrosis, in which the sequestrum remains unabsorbed, for an indefinite length of time, producing no violent irritation, yet, always enough to teaze the patient, and disturb his health.

“In necrosis of the long bones, there are always round apertures in the new osseous shell, corresponding with the external fistulous openings, so long as the sequestrum remains enclosed in it.

“The tibia, femur, lower jaw, clavicle, humerus, fibula, radius, and ulna, are most frequently affected with necrosis. Excepting the lower jaw and scapula, the process of regeneration has only been noticed, in the cylindrical bones. From twelve to eighteen years of age is the time of life most subject to necrosis. The necrosis of the lower jaw, however, seldom occurs before the age of thirty. In some persons, two bones are affected at once owing to constitutional causes.

“The process of cure is said to take place with more celerity in the lower jaw, than any other bone, and may

be completed in three months. Mr. Russell has never known a necrosis of the tibia get well in less than a year; but, in general, nearly two years elapse first; sometimes, the cure is protracted to a much greater length of time.

“When the constitution is predisposed to necrosis, any cause, capable of exciting inflammation, may occasion an attack of it. Often, however, the disease is purely sporadical, and not referrable to outward causes. Cases, which occur from external injury, are generally those of the lower jaw, which are frequently imputable to blows, the application of acrid substances to carious teeth, effects of mercury, &c.

“Necrosis of the lower jaw and clavicle never proves fatal: that of the lower extremities, which is the worst case, does so very seldom, and only, from the violence of the first inflammatory symptoms, which rapidly bring on a hectic fever, which proves incurable without removing its local cause by a timely amputation. When the violence of the first stage, however, has abated, the irritation ceases, and the hectic symptoms, if there are any, are generally moderate. Nor is this state of tranquillity disturbed, till the sequestrum, in making its way outward, again produces irritation. At this second period of urgency, extensive inflammation may originate, ulcerations spread all over the surface of the limb, assume an unhealthy appearance, violent fever succeed, and the patient either perish, or sink into a state, in which he must consent to amputation, as the only means of saving his life. This is the last crisis of imminent danger; but, in general it is less perilous, than when the inflammation comes on in an incipient stage of necrosis.”

TREATMENT.

It may not be improper to remark in the first place that much may be done in preventing necrosis, and if the surgeon be called during the inflammatory stage of the disease which precedes the death of the bone, the antiphlogistic measures are to be vigorously employed. Bleeding, general and local, purging, and blisters will be found of great use, and there is reason to believe these remedies frequently successful in arresting the progress of the disease.

When the bone is actually dead it has already been stated that the actions of the adjacent parts are in general competent to the cure, but in many cases art is required.

The means necessary to be pursued vary with the cases which occur; when the dead portion is part of a broad flat bone, nothing is required but to wait for exfoliation, which in general is accomplished without surgical assistance. An inflammatory circle may be seen surrounding the dead portion, and after a time, a distinct fissure is formed and grows gradually wider, separating in every part of its circumference the dead from the living bone; if only a superficial part of the bone have lost its life (either in a flat or a round bone) then the separation proceeds underneath this plate, and it is gradually detached and loosened. It is useful in this stage of the process daily to move the loosened part as soon as it admits of motion, but there is no necessity for taking away a part of it by means of a trephine, or by scraping it thinner, because the same natural process is required for removing a small as a large, a thin as a thick portion of bone, and precisely the same period of time will be required for separating the one as the other, supposing their surfaces to be equal. Exfoliations from the skull afford frequent illustrations of these remarks.

When any of the cylindrical bones are affected with

necrosis through their whole extent, and the sequestrum is included in the new bone, it generally occasions so little inconvenience that it may be deemed bad surgery to interfere with the operations of nature.

When the adjacent parts inflame, leeches and blisters should be applied, and the blisters should be dressed with savin ointment as recommended by Crowther.

In some cases it becomes necessary to remove by a surgical operation the sequestrum. This is often a very painful, difficult, and hazardous operation. Supposing the affection seated in the thigh bone, nothing but necessity should induce the surgeon to lay bare and extract the dead bone before it becomes loose and approaches the surface.* In the tibia the operation is easier performed and oftener required.

The circumstances which should induce the surgeon to perform the operation are, when great irritation is experienced from the dead bone,—when it can be easily removed in consequence of its superficial or exposed situation,—when the new bone incloses or overlaps it in such a way that a long period will probably be required for its removal, and when the articulating extremities of the bone are sound, for if these be diseased, amputation should be preferred to the extraction of the dead bone.

OPERATION.

This operation varies so much in different cases that general rules only can be given for performing it. The first stage of it consists in laying bare the affected bone, and this should be done by cutting through the soft parts where they are thinnest, and where there is least danger of meeting with large blood-vessels, or other important parts. It is best to remove completely

* The necessity alluded to is the extreme exhaustion and hectic state of the patient.

a portion of the integuments covering the bone by means of two curved incisions meeting at their extremities; a simple incision does not sufficiently expose the bone. After laying bare the new bone, a perforation is to be made through it with a trephine, and by means of this the sequestrum contained in it can be readily examined, and if small, can now be extracted. If this, however, cannot be done, the remainder of the operation consists in enlarging the opening by means of Hey's saw, or of chisels and gouges, until the dead bone can be removed. In general, it is best to perforate the lower part of the new bone, because a smaller aperture at an extremity will be sufficient, than at the middle of the bone. Perhaps the operation may in some cases be facilitated by breaking with strong forceps the sequestrum, when it is found too large to be conveniently extracted. After the dead bone is removed, the wound is to be dressed with dry lint, and treated as a common wound.

Mr. Boyer is of opinion that very few cases occur which warrant the operation; the British surgeons, on the contrary, often perform it. There can be no doubt that in many cases, great advantage must accrue from it, and whenever it is practicable, under the circumstances which have been mentioned, it ought to be performed. To ascertain in the clearest manner the propriety of an operation, Mr. Russell's mode of examining the parts may be adopted; it consists in laying bare small portions of the bone in the vicinity of the fistulous openings, and if possible, introducing a probe into its cavity; but if this cannot be done, a small hole may easily be drilled by means of a perforator, and through this the examination may be made. If a large loose sequestrum be found, the operation of extracting it can be subsequently performed in the manner above directed.

CHAPTER LX.

Of Setons and Issues.

A SETON is a wound kept in a suppurating state by means of a foreign matter which prevents its healing. The usual manner of making a seton is to pass a large flat needle nearly half an inch broad, through a folded portion of the skin. The needle is double-edged, and is armed with a skein of silk or thread dipped in sweet oil. The principal cautions necessary in forming a seton are in pinching up the fold of skin to avoid any other substance, and to be careful not to puncture any deeper seated part; and in the next place, to make the apertures through the skin sufficiently distant to prevent the thread from ulcerating through it.

If no seton needle be at hand, the same end may be answered by puncturing a fold of skin with a common lancet, and then by means of an eyed probe, a skein of silk or thread can be passed through the wound.

Setons may safely be made almost in any situation on the surface of the body. It is convenient to have one opening more dependent than the other, in order to facilitate the discharge of pus. The skein of silk or thread should remain for a few days untouched until it becomes loosened by means of suppuration, after which that part of it which is nearest the wound is to be smeared with oil or ointment, and gently drawn into the suppurating canal. This process is to be repeated once or twice every twenty-four hours, and when the thread is nearly all used, a fresh skein is to be attached to it.

Great attention should be paid to cleanliness, espe-

cially in warm weather, and the silk or thread should be prevented from imbibing the pus which is discharged.

It is easy when the matter does not flow in sufficient quantity to stimulate the wound by mixing cantharides with the oil or ointment smeared upon the thread.

ISSUES are small ulcers artificially established for the purpose of procuring a discharge of pus. They form an important remedy in several diseases, and it is therefore of consequence to understand the best and easiest methods of making them.

The situation in which the issue is to be formed is generally pointed out by the disease, but it is best to avoid placing them over a bone which is thinly covered, or over a considerable tendon, nerve, or blood-vessel, for very obvious reasons; the belly of a muscle is also an unfavourable spot upon which to form an issue, because the motion of the part will occasion pain and inconvenience.

Among the most convenient situations for issues are the back part of the neck—the spaces along-side of the spinous processes of the vertebra—the arm at or near the insertion of the deltoid muscle—a hollow on each side of the knee above the flexor tendons of the leg.

Various methods of forming issues have been contrived. Among the simplest is the application of a small blister, which is to be dressed from time to time with epispastic ointment. This, however, is a plan which occasions a good deal of trouble to prevent the sore from healing, and the discharge is not in general sufficiently copious.

Incisions are sometimes made through the skin, and into these incisions beans and peas are inserted to prevent the wound from cicatrizing.

The use of caustic is however the best and most usual method of forming issues. The manner in which I have

been taught, and accustomed to apply it is as follows. A piece of leather is to be spread with adhesive plaster, and a hole is to be cut through this leather of the size and form of the intended issue. Another piece of leather is to be spread with the same plaster, in order to confine the caustic. The plaster first mentioned is to be warmed and applied to the skin in such a way that the hole cut through it may be on the part where the issue is to be made; this hole is to be filled up with paste caustic and covered by adhesive plaster, to prevent it from falling off. The paste caustic is made by mixing two parts of fresh burnt quick lime and one of common caustic (pure vegetable alkali) together, in powder, and forming them into a paste with a little soap, and a few drops of water. The caustic is to be left on until it destroys the skin, which will generally be found black and gangrenous in an hour and a half or two hours, but if not, it must be reapplied and allowed to remain still longer. A poultice is afterwards to be applied, and in the course of a few days the eschar will separate from the sound parts.

Dr. Wistar has contrived a method of forming issues which I think the most simple and least painful I have ever tried; it consists in blistering with Spanish flies the surface of the skin, and rubbing for about ten minutes the blistered surface with common caustic. In this short space of time an issue is formed of the necessary depth. In order to make the issues of the proper shape, it is best to apply the Spanish flies to the skin in the same manner as the paste caustic is usually placed, in a hole cut out of a piece of leather spread with adhesive plaster.

In order to keep an issue from healing it is necessary to press upon its surface beans, peas, or other foreign bodies, and occasionally to apply savin cerate, or Span-

ish flies. I have often used a small block of hard wood with lozenges cut upon it; the points of these lozenges bound upon the issue are more convenient of application than the beans or peas. To prevent the wood from imbibing moisture it may be coated with a solution of sealing wax in spirit of wine.

Fungous granulations frequently arise from issues, and grow to a very considerable height; when this happens, the application of lunar caustic should be made and repeated as often as may become necessary, and the future growth of these granulations may be prevented by dressing the issue occasionally with escharotics, as burnt alum, or red precipitate.

Issues should be washed twice in twenty-four hours with warm water; if cleanliness be neglected they become extremely offensive.

CHAPTER LXI.

Of Mal-formations.

To enumerate all the deformities found in new born infants would require many chapters. The records of medicine, especially those written in more credulous ages, are replete with monstrosities in every form. The writings of Ambrose Paré exhibit a motley group of these prodigies.

On the present occasion it will only be necessary to speak of those deformities which are of frequent occurrence or which can be remedied by art.

OF HARE-LIP.

Fissures in the upper lip of infants extending in many cases through the roof of the mouth, affecting the bone as well as the soft parts, have received from the resemblance to the mouth of the hare, the appellation of hare-lip. In some cases the fissure is in the middle of the lip; more generally it is on one side, and occasionally there is a double hare-lip, a fissure existing on each side.

Its extent varies considerably; sometimes it is confined to the edge of the lip, at other times it extends up to the nose and even into the nostril; sometimes, the lip alone is affected, in other cases the gum, and superior maxillary bone are divided, and the fissure extends even through the roof of the mouth completely to the soft palate, the nostril and mouth forming one cavity. The velum pendulum palati is sometimes divided.

The deformity, if no other inconvenience existed,

would be a sufficient motive for the performance of any operation necessary to effect its removal, but in addition to this, the child sucks and swallows with great difficulty, and if a cure be not effected will remain unable to articulate distinctly.

It is the custom to postpone the operation for hare-lip till the infant advances to the age of two years and upwards, under an idea that convulsions will result from it—this caution is I believe superfluous, and the earlier the operation is performed, the more complete will be its beneficial consequences especially in those cases where the bones are affected, because in very early life the vacuity will be more perfectly filled up.

The operation for the cure of hare-lip consists in paring off the epithelium and skin of the lip, on each side of the fissure, and keeping the cut surfaces in contact by means of the twisted suture. We are directed in the more modern surgical authors, to perform the operation with a sharp scalpel, from a fear that the contused wound occasioned by scissors will not unite by the first intention, this caution, proceeding from an unnecessary refinement upon the doctrines of adhesion is totally useless, the operation may with great facility be performed by scissors, and the wound heals in every instance by the first intention, provided the suture is properly applied.

It is of great consequence whether the knife or scissors be employed, to cut out the upper angle of the fissure, that the piece removed shall form the letter V, if this be not attended to, the whole of the surfaces will not unite.

When the skin of the lip is removed, the wound resembles any other incision through the same part, and the mode of treatment must be similar to that employed

in wounds through the lip. Two silver pins with moveable steel points are to be passed into the lip half an inch from the wound, these pins are to be pushed through the substance of the lip in such a manner as to pass through the wound; they should not extend deeper than two-thirds through the substance of the lip, the points are to be brought out half an inch from the wound on the opposite side, and then removed; a firm ligature of waxed thread is now to be passed round and round these pins in the form of the figure 8, in such a manner as to confine the sides of the wound in contact, (see plate I.) In this manner the twisted suture is formed, and it certainly is more convenient and effectual than the interrupted suture in this particular instance, although the latter is preferred by some surgeons, and no doubt answers tolerably well.

When the operation for hare-lip is deferred until the teeth have grown, we often find the large incisors projecting on the edges of the fissure in the upper maxillary bone, they should be removed in such cases before the operation is performed.

In double hare-lip the same method of removing the skin is to be performed on both sides, but the number of pins need not be increased in this case, they must pass through the insulated central portion of the lip, and great care is necessary in the accurate co-aptation of the wounded surfaces. The pins should in general be taken out at the end of the fourth day from the operation.

When the lower lip is totally or partially affected with cancer, its removal becomes necessary; in these cases an incision is to be made on each side of the diseased part with a bistoury or scalpel, and the lip dissected loose from the lower jaw; if practicable the incisions should meet in a point at the chin, or on one side of it, and then the sides of the wound can be closed by the

twisted suture, the pins being introduced and the ligature applied, just as in cases of hare-lip, if even the whole lip is extirpated the deformity is by no means very great. The bleeding, in operations both on the upper and under lip, is generally profuse at first, but soon ceases. Cancer of the upper lip is to be extirpated and treated when practicable in the same manner.

CHAPTER LXII.

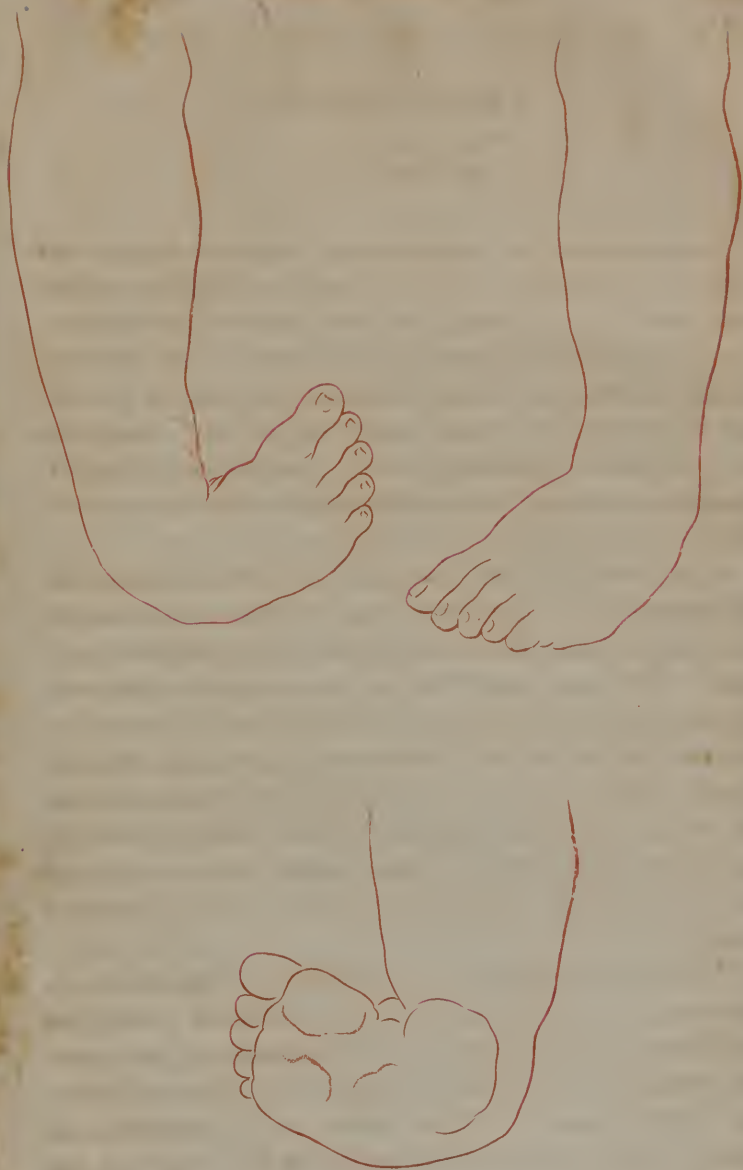
Of Club Foot.

It is a matter of some surprise to all intelligent men that the treatment of distorted limbs has excited so little the attention of surgeons. In consequence of this neglect, the management of such cases generally falls into the hands of empirics, or nurses, and if this class of persons are warrantable for their interference in any complaints it is in these, because the cure consists in mechanical contrivances which cannot affect life, and which are often highly serviceable.

It is evident at the first view of such a subject, that distortions of the feet must vary greatly in their nature and degree, and consequently require very different treatment. The most usual form of the complaint, however, consists in a turning inward and upward of the sole of the foot, in the manner represented in the opposite outlines; when a person with such a foot begins to walk, he walks on the outer edge of the foot, and the deformity gradually increasing, the upper part of the foot becomes the lower, and he walks upon the top or instep instead of the sole.

The relative position of the bones of the tarsus to those of the leg is altered in club foot, and constitutes one derangement of the parts. The bones of the tarsus are themselves unnaturally formed, and this constitutes a second deformity. The action of the muscles upon parts changed from their natural form will tend very materially to augment the deformity, and consequently the longer they are suffered to act, the greater this deformity will be.

Club Foot.



As drawn by del & Sculp.



The first of these is the fact that the
 and the second is the fact that the
 and the third is the fact that the
 and the fourth is the fact that the
 and the fifth is the fact that the

The sixth is the fact that the
 and the seventh is the fact that the
 and the eighth is the fact that the
 and the ninth is the fact that the
 and the tenth is the fact that the

The eleventh is the fact that the
 and the twelfth is the fact that the
 and the thirteenth is the fact that the
 and the fourteenth is the fact that the
 and the fifteenth is the fact that the

The sixteenth is the fact that the
 and the seventeenth is the fact that the
 and the eighteenth is the fact that the
 and the nineteenth is the fact that the
 and the twentieth is the fact that the

The twenty-first is the fact that the
 and the twenty-second is the fact that the
 and the twenty-third is the fact that the
 and the twenty-fourth is the fact that the
 and the twenty-fifth is the fact that the

The causes of club foot are not very easily ascertained; what effect pressure on the fœtus in utero may have I am not prepared to decide.

The indication of cure in club foot is to effect by artificial means a change from the unnatural to a more natural posture of the foot, and this is to be attempted by splints and bandages accommodated to the particular nature of each case.

It is of great importance to commence the treatment of club foot as soon as possible after birth. The bones are not at this time completely formed, and are susceptible of any change in shape which circumstances may direct. The muscles have not yet acted sufficiently to augment the original derangement. We are not, however, to be deterred from endeavours to *relieve* the complaint even when years have elapsed before surgical aid is requested, for great benefit has been derived in many cases from the use of the necessary machinery even after the age of puberty.

To effect a change in the shape of the foot, permanent pressure must be applied in such a manner as to separate those parts where bony matter is deficient, and to force together those in which it is redundant; this will be in fact to bring the foot as nearly as possible to its natural form.

Mr. Sheldrake, an ingenious instrument maker of London, who has acquired much celebrity by his skill in the treatment of club foot, has very correctly stated the manner in which pressure acts in restoring the natural form.

“If so much pressure is applied as to bring the separated parts of those bones into contact, and is invariably supported, it will stop the growth of that gelatinous substance, which is first formed in those parts where the bones come in contact with each other; in those parts which do not come in contact, it will continue to grow

till they meet; the progress of ossification will be continued, in the natural way, till the patient arrives at maturity; and with no more mal-formation than existed at the time the pressure was first applied.

“If more pressure is applied and uniformly kept up, the cartilages will be compressed in those parts in which they come in contact; and if only the natural action of the foot is permitted, will assume a permanent form, as nearly approaching to the natural one, as the pre-existing deformity will admit. This compression of the cartilages will, by condensing their substance, prevent the arteries from shooting so freely into it, in an improper direction, as they would have done but for this impediment, and thus stop the progress of ossification in an improper direction, while that process will go on in the natural way, in every other part, till the patient has arrived at maturity, and every part is completely formed.

“If the same pressure is uniformly continued, or a greater degree of pressure be constantly applied, the action of the arteries, which deposit the earthy particles nearest the surface of the bones, will likewise be impeded, while the action of the absorbents, which, in the course of circulation, are employed in taking up earthy particles, will be continued in full vigour, if it is not increased; and by perseverance in this process it is certainly possible, that an unequal action, *i. e.* a diminished action of the secreting vessels, and an increased action of the absorbing vessels, may be kept up, and so modified, as to alter the form of these bones, long after they are ossified; and, of course, so much of the deformity of such feet as depends on mal-formation of the bones, may be radically cured, long after that period of life at which they have generally been thought incurable.”

When the deformity consists in a curvature at the ankle joint, and another in the foot, which is the case in a

majority of instances, a great deficiency of bone appears in the inside of the foot, as much as if one of the cuneiform bones were completely absent, and a proportionate surplus of bone exists on the outside. In such cases Dr. Physick has succeeded in removing every vestige of deformity by a contrivance which is represented in the annexed plate.

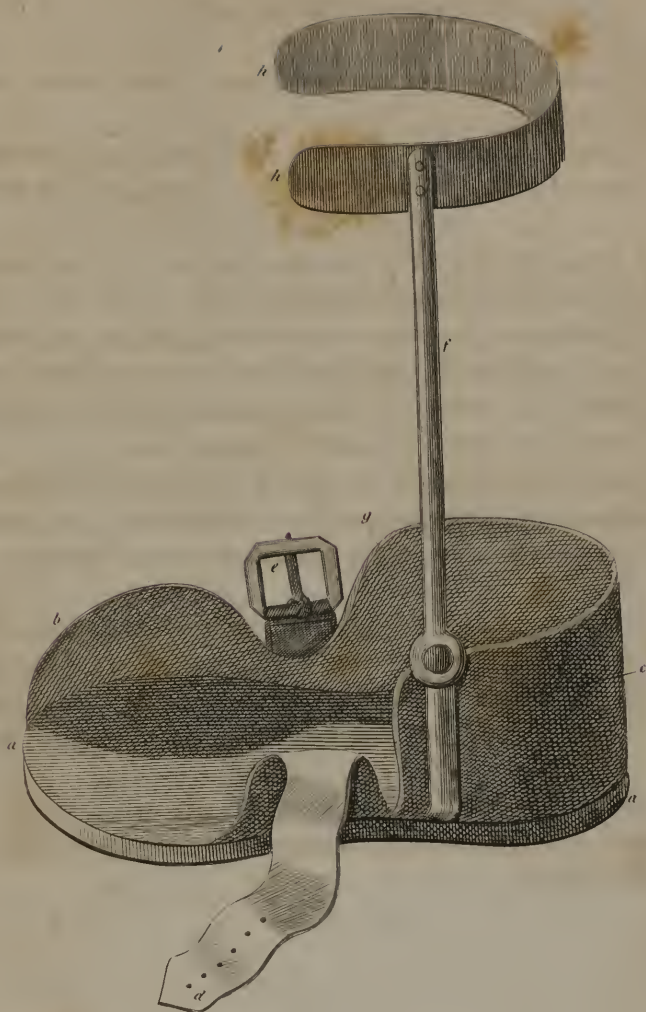
From the uniform success which resulted from the application of this apparatus, I have used it, and known it used in a great number of instances, and I recommend it in preference to every other machine; modified according to circumstances, I believe in applicable to every case of club foot which is met with in practice.

I lament that I have not been able to procure a treatise on club foot which has recently been published by Professor Scarpa, as I have no doubt his industry and zeal must have thrown light on this, as on the other subjects of which he has treated.

EXPLANATION OF THE PLATE.

- a. b.* A shoe made of sheet tin covered with leather.
- a. a.* The sole.
- b.* A projecting plate of tin soldered to the sole, by which lateral pressure is made on the inner edge of the foot at *b*, and on the outer edge of the heel at *c*.
- d.* A strap passing over the top of the foot and secured to the buckle *e* on the opposite side. The object of this strap is to compress the upper part of the foot, and to bring the sole gradually in contact with the sole of the shoe. It should always be drawn tight enough to prevent the foot from turning.
- f.* A steel splint passing up the leg to counteract the tendency of the ankle joint to turn inwards; the joint *g*, allows some degree of extension and flexion to the foot.
- h. h.* A plate of thin brass, iron, or tin, passing round the leg. This plate as well as the steel splint are covered with soft buckskin, which laces in front, but which to prevent confusion is omitted in the drawing.

The instrument here represented is adapted to the left foot of a new born infant. A larger one must be used for an older child.





CHAPTER LXIII.

Of Spina Bifida.

THIS consists in an imperfect state of one or more of the vertebræ, and a swelling containing a fluid at the spot where the imperfection exists.

The tumour is generally found at one of the lumbar vertebræ; sometimes on the os sacrum; and occasionally at one of the cervical or dorsal vertebræ. A tumour analogous to this occurs on the heads of children, and is called by the same name. The swelling in every case appears to result from imperfect ossification, or a congenital deficiency of some part of the cranium or spine.

Children affected with spina bifida seldom live long. Warner relates an instance in which the patient lived to the age of twenty, but in general they survive a very few years.

The fluid contained in the tumour is commonly a limpid colourless serum, but sometimes it has been found turbid and tinged with blood. In examining spina bifida, a fluctuation can always be felt, and in general the deficiency of bone can be discovered by the finger; this deficiency is usually between two of the spinous processes, though sometimes one spinous process is entirely wanting; a membrane, supposed to be a continuation of the dura mater, invests the fluid, and forms a kind of cyst around it, adhering closely to the external integuments.

Paralysis of the lower limbs sometimes attends the complaint, but not uniformly.

No remedy has hitherto been discovered for this complaint; and it has not, so far as I have learned, in a single instance been cured. The tumour has been opened by caustic and by incision, always with a fatal result.

Mr. Abernethy has proposed to compress the tumour gradually from its commencement, with a view to effect the absorption of the fluid, and to prevent the distension of the unsupported dura mater. He also suggests the propriety, if this should fail, of puncturing the tumour with a finely cutting instrument, the wound to be immediately after closed with sticking plaster, and healed: the reaccumulation of the fluid he proposes to prevent by local pressure. In one case Mr. Abernethy punctured a spina bifida every fourth day for six weeks, during which time the child's health continued unaffected, and the wounds healed. The plaster, however, was rubbed off from one of the punctures, and the part ulcerated; the opening could not be healed, and death ensued: the discharge being previously changed from serum to a purulent fluid.

Mr. Benjamin Bell proposed to tie a ligature firmly upon the tumour, a practice in no respect adapted to the case, and Richter's proposal of issues is as little likely to be serviceable; so that a remedy for spina bifida is still to be considered a desideratum.

Spina bifida is occasionally accompanied by hydrocephalus. A rupture of the tumour in such a case has occasioned a diminution of the size of the patient's head, and discharged the fluid contained in it. I have evacuated the water of a hydrocephalus through a flattened trochar in a child several times, with the effect relieving the symptoms, but death resulted. Upon dissection I found that my operation had been a very safe one, for the whole brain was compressed in such a way as to form a lining for the dura mater scarce half an inch thick, its blood-vessels were very small, and the punctures had healed up. Whether Mr. Abernethy's operation on the spina bifida would be more successful I very much doubt, it is however warrantable,—“*anceps remedium potius quam nullum.*”

Mr. Astley Cooper has published some cases which I shall here insert as proofs, that this disease is no longer to be considered as utterly beyond the reach of surgery.

“James Applebee, Baldwin Street, Old Street, was born on the 19th of May, 1807, and his mother, immediately after his birth, observed a round and transparent tumour on the loins, of the size of a large walnut.

“Mr. Deering, who was her accoucheur, requested Dr. Petch to see the child with him, who informed the mother of the dangerous nature of the complaint, and of the probability of its fatal termination.

“On the 22d of June, 1807, the child was brought to my house, and I found, that although it had spina bifida, the head was not unusually large; that the motions of its legs were perfect; and its stools and urine were discharged naturally.

“I applied a roller around the child’s waist, so as to compress the tumour, being induced to do so from considering it as a species of hernia, and that the deficiency of the spine might be compensated for by external pressure.

“The pressure, made by the roller, had no unpleasant influence on its voluntary powers; its stools and urine continued to be properly discharged, but the mother thought, that the child was occasionally convulsed.

“At the end of a week, a piece of plaster of paris, somewhat hollowed, and that hollow partly filled with a piece of lint, was placed upon the surface of the tumour: a strap of adhesive plaster was applied to prevent its changing its situation, and a roller was carried around the waist, to bind the plaster of paris firmly upon the back, and to compress the tumour as much as the child could bear.

“This treatment was continued until the month of October, during which time, the tumour was examined

about three times a week, and the mother reported, that the child was occasionally convulsed.

“When the child was five months old, a truss was applied, similar in form to that, which I sometimes use for umbilical hernia in children, and this has been continued ever since.

“At the age of fifteen months, it began to make use of its limbs; it could crawl along a passage, and up two pair of stairs.

“At eighteen months, by some accident, the truss slipped from the tumour, which had become of the size of a small orange, and the mother observed, when it was reduced, that the child appeared in some degree dull; and this was always the case, if the truss was left off for a few minutes, and then re-applied.

“At fifteen months, he began to talk; and at two years of age, he could walk alone.

“He now goes to school, runs, jumps, and plays about, as other children. His powers of mind do not appear to differ from those of other children. His memory is retentive, and he learns with facility. He had the measles and small-pox in the first year, and the whooping cough at three years. His head, previously and subsequently to the bones closing, has preserved a proper proportion to the other parts of the body.

“The tumour is kept by the truss entirely within the channel of the spine; but, when the truss is removed, it soon becomes of the size of half a small orange. It is therefore necessary, that the use of the truss should be continued. When the truss is removed, the finger can be readily pressed through the tumour into the channel of the spine.” (*Medico Chirurgical Transactions, Vol. 2. p. 323, &c.*)

The next case, also published by Mr. Astley Cooper,

will prove, that spina bifida may sometimes be treated on another plan, so as to accomplish a permanent cure.

“ January 21st, 1809, Mrs. Little, of No. 27, Limehouse Causeway, brought to my house her son, aged ten weeks, who was the subject of spina bifida.

“ The tumour was situated on the loins; it was soft, elastic, and transparent; and its size about as large as a billiard-ball when cut in half; his legs were perfectly sensible, and his urine and feces were under the power of the will, &c.

“ Having endeavoured to push the water, contained in the tumour, into the channel of the spine, and finding that if the whole was returned, the pressure would be too great upon the brain; I thought it a fair opportunity of trying what would be the effect of evacuating the swelling by means of a very fine pointed instrument, and by subsequent pressure to bring it into the state of the spina bifida in Applebee’s child.

“ I therefore immediately punctured the tumour with a needle, and drew off about two ounces of water.

“ On the 25th of January, finding the tumour as large as before it had been punctured, I opened it again, and in the same manner, and discharged about four ounces of fluid. The child cried when the fluid was evacuated, but not whilst it was passing off.

“ On January 28th, the tumour was as large as at first, I opened it again, and discharged the fluid. A roller was applied over the tumour, and around the abdomen.

“ February 1st, it was again pricked, and two ounces of fluid discharged.

“ On the 4th, three ounces of fluid were discharged.

“ On February 9th, the same quantity of fluid was evacuated as on the 4th; but, instead of its being perfectly clear, as at first, it was now sanious, and it had been gradually becoming so in the three former operations.

“On the 13th, the same quantity of fluid was taken away; a flannel roller was applied over the tumour and around the abdomen; a piece of pasteboard was placed upon the flannel roller over the tumour, and another roller over the pasteboard to confine it.

“On the 17th, three ounces of fluid, of a more limpid kind, were discharged; the pasteboard was again applied.

“On the 27th, the surface of the tumour inflamed; the fluid, not more than half its former quantity, was mixed with coagulable lymph, and the child, suffering considerable constitutional irritation, was ordered calomel and scammony, and the rollers were discontinued.

“February 26th, the tumour was not more than a quarter of its former size; it felt solid; the integuments were thickened, and it had all the appearance of having undergone the adhesive inflammation.

“On the 28th, it was still more reduced in size, and felt solid.

“On March 4th, it was in the same state as on the 28th of February.

“March 8th, the swelling was very much lessened; the skin over it thickened and wrinkled; a roller was again had recourse to; a card was put over the tumour; and a second roller was applied.

“March 11th, the tumour was much reduced; the skin covering it was a little ulcerated. On the 15th, it was flat, but still a little ulcerated.

“On the 27th, the effused coagulable lymph was considerably reduced in quantity, and of a very firm consistence.

“On the 2d of May, nothing more than a loose pendulous bag of skin remained, and the child appearing to be perfectly well, the bandage was soon left off.

“On December 18th, it was attacked with the small-pox, and went well through the disease.

“The skin now hangs flaccid from the basis of the sacrum; its centre is drawn to the spine, to which it is united, and thus the appearance of a navel is produced in the tumour by retraction of the skin.

“The pricks of the needles are very obvious on each of the punctured parts of the tumour, forming slight indentations.” (*See Medico-Chirurgical Transactions, Vol. 2. p. 326—329.*)

CHAPTER LXIV.

Of Imperforate Anus.

MR. BENJAMIN BELL has published in his system of surgery a very good account of this subject; from that work I shall offer the following extract.

“Although an imperforated anus is not a frequent occurrence, yet as it is occasionally met with, and as it is of much importance to have such deficiencies soon discovered, every midwife ought to examine with attention the state of all the natural passages as soon as possible after delivery.

“In some cases of this nature, the end of the rectum is found to be somewhat prominent at the usual situation of the anus, and to be only covered with skin and a small quantity of cellular membrane: but in others, no vestige of the rectum can be perceived; and the skin retains its natural appearance, without being any where elevated betwixt the scrotum and the point of the coccyx.

“In some of these, the rectum has been found to terminate within an inch of the ordinary seat of the anus; in others it has reached no further than the top of the sacrum. In some it has been known to terminate in the bladder; and in others, in the vagina.

“When the assistance of an operator is required in such cases, as death is in all probability to be the consequence if a proper vent be not obtained for the fæces, no time should be lost in deliberation.—If the end of the gut is found to be covered with skin merely, and if a protuberance is formed by the fæces pushing it forward, all that a surgeon has to do, is with a scalpel or lancet to make an opening sufficient for evacuating them; but

when no direction of this kind is met with, the case comes to be much more complicated, and more difficulty and danger are accordingly to be expected.

“In such cases where the gut is found to lie deep, on the child being properly secured, an incision of an inch in length should be made directly on the spot where the anus ought to be; and this should be continued by gradual and repeated strokes of the scalpel, in the direction the rectum is usually known to take; not in a direct course through the axis of the pelvis, for in that direction the vagina or bladder, or perhaps both, might be brought to suffer; but backwards along the coccyx, where there is no risk of wounding any part of importance. The best director in every case of this kind, is the finger of the operator. The fore-finger of one hand being pushed in towards the coccyx, the surgeon with the scalpel in the other, should dissect gradually in this direction, either till he meets with fæces, or till the scalpel has reached at least the full length of his finger; and if, after all, the fæces are not evacuated, as death must undoubtedly ensue if something further be not attempted, a long trochar should be pushed forward upon the finger, in such a direction as the operator thinks will most probably meet with the gut.

“In this manner many lives have been saved which would otherwise have been lost. I myself have had two such cases; in both of which the gut lay deep, and in both I was fortunate enough to form an anus, which for a good many years has continued to answer the purpose sufficiently. But in each of these a great deal of difficulty was experienced in preserving the passage sufficiently wide and open; for as soon as the dossils of lint and other tents made use of for preserving the passage were withdrawn, such a contraction occurred as for a considerable time rendered the evacuation of the fæces extremely difficult. Sponge tent, gentian root, and other substances

which swell by moisture, were at different times employed; but these were uniformly found to produce so much pain and irritation as rendered their continuance altogether inadmissible : applications of this kind are frequently, indeed recommended in such cases; but any person who has ever used them in parts so exquisitely sensible as the rectum always is, will readily acknowledge the impropriety of the advice.

“Dossils of soft lint moistened in oil, and rolls of bougie plaster of a proper size, were found to irritate less than any other application; and for the purpose of dilating the passage, when, at different times during the cure, it was found to have become too strait, the method we have already had occasion to mention, of compressing blood-vessels in the rectum by introducing a sheep’s gut shut at one end, into it, and forcing water into it by the other, was also found to answer here. But, upon the whole, although this part of the cure may appear to those who have not met with such cases, to be a simple and easy matter, it is found to be much otherwise in practice. Indeed, no case I was ever concerned in afforded so much trouble and perplexity as was experienced from each of those I have mentioned; for although in both, the openings were at first made sufficiently large, yet nothing but a continued attention for the space of eight or ten months prevented the necessity of a frequent repetition of the operation. When the skin alone is to be cut, it is a very simple matter indeed; for in this case nothing in general is necessary but the introduction of a dossil of soft lint for a few days into the opening made by the scalpel. But when the rectum lies very deep, I am inclined to think, from the event of these cases alluded to, that although, ultimately, a complete cure may commonly be obtained after a free discharge of fæces is procured, that much nicety and attention on the part of

the operator will always be required for a considerable time after the operation ; and in general we may suppose, that the difficulty will be in proportion to the depth of the cut.

“Even where the gut is found to terminate in the bladder or in the vagina, the operation we have recommended should be undoubtedly practised : for, in the former case, as all the *fæces* must be emptied into the bladder, much risk must occur of such accumulations being formed as may put a total stop to the discharge by the urethra ; and in the latter, where the rectum terminates in the vagina, much inconvenience and distress must be incurred ; which, if the operation succeeds, may possibly be prevented. There cannot indeed be any certainty of the operation in question proving altogether effectual in obviating the inconveniences produced by the gut terminating in the bladder or vagina, as there must still be a probability of part of the *fæces* continuing to pass off by these outlets ; but as a free passage procured in this manner, affords at least a tolerable chance of relief, no doubt ought to be entertained of putting it in practice.

“When it unfortunately happens that no passage is obtained for the *fæces* by any of the means we have pointed out, might not we attempt an opening above the pubes, or perhaps on the right side so as to reach the *caput coli*, with a view of making an artificial anus in one or other of these places ? It is true, the chance of success from such a measure would not be great ; and, even allowing the attempt to succeed in the most complete manner, the discharge of *fæces* from such openings would always prove troublesome and uncomfortable : but the melancholy idea of leaving a child in such a situation, to die in much pain, must prove so highly distressing, both to the friends and the operator, as would at any time rather incline one

to have recourse even to the doubtful and desperate remedy we have mentioned." (B. BELL.)

A very interesting case of imperforate anus is related by my friend Dr. J. A. Smith, in the second volume of the *New York Medical and Philosophical Journal*; in that case the rectum communicated with the urethra, through which canal its contents were evacuated. An unsuccessful operation was performed for the relief of the patient, the wound healed, but within a month the child expired, and no dissection being permitted, the mode and place of communication between the rectum and urethra or bladder remained unknown.

Mr. Bell's proposal to cut into the caput coli, or to make an opening above the pubes, is one which has never been put in practice, and probably never will be by any prudent practitioner.

CHAPTER LXV.

Of Imperforate Vagina.

It is by no means unusual to find in new born girls, that the vagina is imperforate. Sometimes the passage is closed by an obstruction higher up than the meatus urinarius, and in that case the bladder evacuates itself as usual, and the imperfection remains for a time undiscovered; sometimes even until after marriage when a surgical operation is found indispensable.

In general the vagina in such cases is closed by a membrane, which is nothing more than the hymen, but is unusually dense and strong; if an aperture exist in it through which the menses can flow, surgical aid will not often be required, but if it be entirely closed a great deal of suffering is experienced by the patient when the catamenia commence, and death has even resulted before the nature of the complaint has been made known.

When the vagina is closed by a membrane, the operation by which it is to be relieved is extremely simple. A straight incision, or if the membrane be very dense, a crucial incision should be made through it, and the wound kept from uniting by the introduction of a sponge tent, or roll of linen. Cases are recorded in which prodigious quantities of black putrid blood have been discharged by such an operation, and the lives of many patients have been saved by this simple process.

A more difficult operation becomes necessary when instead of a mere membrane to be divided, the surgeon finds an obliteration of the vagina, or a concretion of its sides. In this case he must proceed by slow and cautious dissection, guarding with extreme care the bladder,

on the one side and the rectum on the other. De Haen relates a case in which the bladder was actually opened and death resulted.

The vagina often becomes obliterated by adhesions, in consequence of inflammation from disease or violence. I have known this to happen from an injury received in parturition, and I have had a patient under my care in whom it resulted from a disease of the uterus. In such cases if they occur in early life, and the menses collect, an aperture must be made for their evacuation.

Dr. Physick has once been called upon to dissect a passage to the uterus, in a case where the vagina was entirely closed up to a considerable distance within the os externum. After a cautious dissection through a very considerable thickness of parts, the operation was accomplished, and the vagina was kept open and dilated by the use of tents.

CHAPTER LXVI.

Of the Cæsarian Operation.

THE extraction of a fœtus from the uterus by means of an incision through the parietes of the abdomen has long been known by the name of the Cæsarian section.

The operation is said to be necessary, first, when the fœtus is alive and the mother has died in labour, or during the two last months of pregnancy; secondly, when the fœtus is dead, but cannot be expelled in the usual manner, in consequence of deformity in the mother, or of the inordinate size of the child; and thirdly, when both mother and child are living, and the causes last mentioned prevent delivery. As the discussion of the causes which may demand the operation would involve a variety of considerations not properly belonging to a surgical treatise, I shall refer to the writers on midwifery for an account of them, and on this question shall simply state that there are some cases in which no doubt can exist as to the propriety of extracting a fœtus by an external incision, the use of the crotchet, however, has greatly lessened the necessity of the operation, and I wish by no means to be understood as recommending it except in cases where in the opinion of a skilful accoucheur the death of the mother is the only alternative, or where after the death of the mother there may be reason to suppose the child alive.

In cases of extra-uterine conception, it is sometimes necessary when the fœtus is situated in one of the ovaries, or fallopian tubes, or within the cavity of the peritoneum, it is impossible for it to be delivered in the usual manner. In these cases I believe the best practice is to wait until

the formation of an abscess takes place, an event which may reasonably be expected. The putrid fœtus will then be evacuated either through the rectum, or through the external parietes; many instances have occurred in which these terminations have taken place, and the mother has happily survived. I received some time since from my friend Dr. Vaughan, of Virginia, the bones of a fœtus evacuated through the rectum, the mother having completely recovered.

Should suppuration, however, take place, and the abscess break externally without a sufficient opening for evacuating the fœtus, the aperture may be enlarged by the knife, to facilitate this process. Such a case occurred recently in New York. Dr. J. A. Smith has detailed it in the first volume of the Medical and Philosophical Journal.

In this case, Dr. Smith remarks, "there were two small orifices through which the matter made its way, one somewhat above, the other directly at the umbilicus. Upon introducing a probe into the latter, bone could be felt at no great depth. As the patient was rapidly sinking under hectic fever and diarrhœa, it was decided that a speedy performance of an operation was the only means of saving her life. Having first introduced a probe into the sac, I made an incision at the inner edge of the right rectus abdominis muscle, from an inch and a half above to the same distance below the umbilicus. At three strokes of the knife I got into the sac, and introducing my finger dilated upwards and downwards as far as could be done with safety, for had I gone beyond the adhesion of the sac to the parietes of the abdomen and thus exposed the cavity of the peritoneum, the patient must have died. I then proceeded to extract the bones with my dressing forceps conducted by my finger, which at first was easily done, but after removing two or three

it became more and more difficult, and at last I found it absolutely impracticable to get away any more, at least without doing a violence to the woman which she could not possibly survive. This disappointment arose from a circumstance which it was impossible to foresee, for from the length of time which had elapsed from the death of the fœtus and other circumstances, we had every reason to suppose that all the soft parts of it were destroyed by putrefaction, but as this unfortunately had not happened I was obliged to desist. This I did the more willingly as I was convinced if the patient did not die of symptomatic fever that the putrefactive process would go on much more rapidly, and that the bones might be taken away as they became detached. The event justified my expectation. The wound was filled with lint, and the patient put to bed. She lost an inconsiderable quantity of blood during the operation, and subsequently recovered, the whole fœtus being removed from the wound within a few days."

An instance is recorded of a living fœtus cut out at the groin. But these are not genuine cases of the Cæsarian operation.

As the operation of opening the uterus through the abdomen may become necessary from invincible obstacles to the extraction of the fœtus, either in a living or dead state, I shall describe in this place the manner of performing it; it should certainly be done before both mother and child have perished from the violence of the pains, flooding, convulsions, &c.

The operation being determined upon in a case of uterine conception, the patient is to be placed upon a table of the usual height and laid upon her back, her head moderately elevated, and her thighs somewhat raised, in order to relax the muscles of the abdomen; au

incision is then to be made six inches long through the skin and cellular substance. In my opinion this incision should be in the course of the linea alba, because no muscular fibres will be here divided, and there will be less probability of wounding an intestine : (an exception however, to this direction will be presently mentioned.) After the linea alba is exposed, an opening should be made through it just below the umbilicus. A probe-pointed curved bistoury is now to be introduced, and with it the incision through the tendon and periosteum is to be enlarged to the size of the external incision, great care being taken not to wound any of the intestines. The uterus is next to be opened by an incision of the same length as the first, and through this the fœtus is to be extracted, and afterwards the placenta and membranes. A case is described by Mr. Artiste in the *Edinburgh Surgical Journal*, in which the operation performed in this manner was completely successful, and both mother and child were preserved.

The cases in which the external incision may be properly made on one side of the abdomen, are those in which a part of the child can be distinctly and prominently felt, and at that part an incision being made prevents the danger of wounding any intestine. Mr. Wood describes a case in the sixth volume of the *Medical Journal*, in which the nates of the child projected laterally and the incision was made nearly in a transverse direction on the left side of the abdomen, beginning at the umbilicus. Instead of dividing the placenta, Mr. Wood introduced his hand betwixt it and the uterus, and extracted the fœtus with ease; a hemorrhage was caused by this, which however soon ceased, and not more than seven or eight ounces of blood were lost. After the uterus was emptied the omentum and intestines protruded from the wound but were reduced readily, and the wound

was dressed by sutures and adhesive plaster. The woman, however, died on the fourth day afterwards.

Mr. Simen, in the *Memoirs of the Academy of Surgery*, relates sixty-four successful cases of the Cæsarian operation, more than half of which were performed on thirteen women, some of whom had undergone the operation once or twice, and others five or six times; one woman had suffered it seven times and always with success. Mr. Tenon counts up sixty-six cases which have occurred at the Hotel Dieu in Paris, and other writers have collected a considerable number. Baudelocque (by no means partial to the operation) reports that of one hundred and eleven Cæsarian operations, performed since the middle of the last century, forty-seven or forty-eight have been successful.* Mr. Capuron the latest French writer on midwifery observes that the Cæsarian operation far from offering a melancholy catalogue of victims, affords a resource always safe for the infant, and very often for the mother,† so that the operation although unquestionably hazardous, ought to be performed in all cases where the delivery is impracticable by other means, and *any hope* exists of saving the mother or infant by it.

In cases of extra-uterine conception the operation as already remarked, had in general better be delayed until suppuration takes place.

* In England the Cæsarian section has generally proved fatal.

† Cours théorique et pratique d'accouchemens, par J. Capuron. A Paris, 1811.

CHAPTER LXVII.

On the division of the symphysis pubis.

ANOTHER operation, the consideration of which properly belongs to midwifery, is described in several systems of surgery, the division of the symphysis pubis for the purpose of enlarging the diameter of the pelvis, in cases of difficult labours. Mr. Sigault, a French accoucheur, contrived this operation as a substitute for the Cæsarian section, than which it is certainly less dangerous and severe; it was adopted by a majority of the French physicians, who proclaimed it one of the most important improvements of the healing art. The British generally rejected it, and subsequent investigations have proved their judgment in great measure correct.

When the operation is to be performed, Mr. B. Bell directs the patient to be placed on her back, upon a table of convenient height; "the pelvis should be elevated with two or three pillows, put beneath it, and the legs and arms should be secured by assistants. When in this situation, the bladder should be emptied by the introduction of a catheter, which should be retained in the urethra by one of the assistants till the division of the bones is completed.

"After shaving the pubis, the operator, standing on one side of the patient, should, with a longitudinal incision, divide the skin and cellular substance covering the pubes at their symphysis. The cut should commence at the upper edge of these bones, and be continued nearly, but not entirely, along their whole breadth: on the bones being laid bare, the cartilages by which they are joined must be slowly and cautiously divided; and as it is by no means hard, it is easily done. Both the teguments

and cartilage may be divided with a firm round-edged scalpel of the common form, which is the only instrument except the catheter that is necessary in this operation. The intention of the catheter is, to point out the course of the urethra to the operator; for it lies so contiguous to the pubes at their symphysis as to be in great danger of being cut, if this precaution be not attended to; even the bladder itself might be injured, were the division of the cartilage not conducted with caution: but with due attention to these points, and avoiding the total division of the soft parts at the under edge of the bones, all risk of hurting either the bladder or urethra may be prevented.

“On the division of the cartilage being completed, the bones recede considerably from each other. To prevent any consequences that might ensue from their separating forcibly and suddenly, the assistants who have the charge of the thighs should be desired to support them, particularly towards the end of the operation; and if a sufficient opening is not gained in this manner, the thighs may afterwards be slowly and gradually separated.

“The child is now to be delivered in the usual way by the vagina, and this being effected, and the placenta removed, the bones should be immediately put together, and retained as exactly as possible in their situation, by the proper application of a cotton or flannel roller round the pelvis and thighs; at the same time that the patient should be desired to remain as much as possible in one posture. The sore does not require any particular attention; in general it heals easily with light and mild dressings; and for the most part the union of the bones is completed in the course of the fifth or sixth week. The patient however should not be allowed to walk, or to put the body into any posture that might effect an alteration in the situation of the bones, till nine or ten weeks have elapsed.”

Mr. Baudelocque declares, that he was unable in any experiments upon the dead subject, to increase the diameter of the pelvis by dividing the symphysis pubis, more than from three to six lines, (at most half an inch ;) on the other hand, some advocates of the operation state, that the pelvis is enlarged by it more than two inches. Mr. Capuron complains that the division of the symphysis pubis has been performed in many cases in which the patient might have been delivered without recourse to it, and upon women who had previously borne several children ; an abuse which cannot be too strongly censured. Mr. Demangeon has lately published a small essay upon this subject, in which he decidedly prefers it to the Cæsarian section, when one or other of these operations must be performed.* I shall not venture an opinion on the question, but conclude by a caution never to perform either of these operations whilst there is the least remaining prospect of delivery without them.

* De Ossium Pubis Synchondrotomia. Parisiis, 1811.

CHAPTER LXVIII.

Of Prolapsus Uteri.

THE uterus losing its natural situation in the pelvis, sometimes descends into the vagina, where it may be felt forming a pyriform tumour projecting into this passage: the os tinæ is situated in the centre of the tumour, and the finger can readily be passed round it, rendering the nature of the case sufficiently evident. A greater degree of protrusion often takes place, and the uterus is found situated exteriorly to the vulva, dragging down the vagina, which consequently doubles on itself, and draws downward the part of the bladder connected with it.

The prolapsus when complete, forms a tumour, of an oblong and nearly cylindrical form, terminating in a narrow circular extremity, in which the os tinæ is situated; through this aperture the menses are discharged at the usual periods.

When prolapsus uteri exists in the degree first described, the uterus being situated within the vagina, the inconveniences experienced from it are, sensations of great weight and uneasiness in the pelvis, sometimes affecting the bladder and kidneys; these sensations not amounting to severe pain, are however very distressing, and are greatly augmented by exercise. Rest in a horizontal posture generally relieves them.

In a more advanced stage, and greater degree, the prolapsus uteri occasions very severe sufferings. The symptoms are aggravated, and often very painful. The external situation of the uterus in a complete prolapsus, exposes it to irritation from various sources; the urine flowing over it, and the friction occasioned by exercise, often produce great pain and distress.

TREATMENT.

When the complaint exists only in a slight degree, the uterus may very readily be pushed back with a finger to its proper situation, and often indeed resumes it when the patient lies in a horizontal posture. The reduction however is by no means so easy when the uterus is completely protruded outside of the vulva. The abdominal viscera having in some measure accommodated themselves to the change in those of the pelvis, do not very readily recede to their natural situation, and consequently preclude the ready return of the uterus : to overcome this obstacle, it is necessary to confine the patient to a low diet, and to a horizontal posture, for a few days, and to administer a cathartic. The warm bath may be used if any difficulty of reduction should remain. By the use of these remedies, and the assistance of the surgeon's fingers, the uterus may be generally replaced. It is unnecessary to wait until all inflammation ceases, because as long as it remains in its unnatural situation, exposed to the external irritations which have been mentioned, it will continue somewhat inflamed ; at the same time it would be highly improper to make any effort at reduction, until the remedies just directed have had the effect of considerably reducing the inflammatory appearance of the uterus.

In order to retain the uterus in its natural situation, an instrument, called a pessary, is to be introduced into the vagina. The pessaries formerly employed, were nothing more than masses of wool, of lint, or other soft materials, adapted to the shape of the vagina ; these are, however, at present laid aside, and a variety of substitutes have been invented.

A pessary ought to be formed of materials sufficiently firm to support the uterus, and so light as not to descend

after it is placed in the vagina. It should be of a solid texture, incapable of imbibing the moisture of the parts, because nothing is more offensive than retained animal secretions. The form of a pessary is an object of importance. Dr. Denman directs them to be made globular; Dr. Clarke prefers a flat oval form, with a perforation in the centre. Both these gentlemen direct the pessary to be made of box-wood, and Denman's is made hollow, that it may be light. The French surgeons form their pessaries of the same materials as those which enter into the composition of the flexible catheter, their form is a ring, and the French pessaries are very light, and to a certain degree resist moisture; but none of these instruments are perfect, they all become exceedingly *fœtid* after remaining a very short time in the vagina. Dr. Physick has had pessaries constructed of silver, very thickly gilt. He prefers the globular form in most cases, and in order to have the instrument light, it is made hollow; two very thin hemispheres of silver are soldered together, highly polished on the outside, and then coated with gold. The silversmiths very easily fabricate such an instrument, and it possesses several advantages. The gold is not affected by the secretions of the vagina, and is the most cleanly substance of which the pessary can be made; the objections to forming the instrument entirely of gold, are, that it is softer than silver, and consequently must be made thicker; which, in addition to its greater specific gravity, would render the pessary too heavy; it is also more expensive. The use of astringent injections has been found advantageous in cases of prolapsus uteri.

Prolapsus uteri occurs sometimes during pregnancy,—on this subject I refer to the writers on midwifery,—as also for an account of the **INVERSION** and **RETRO-VERSION** of the uterus.

CHAPTER LXIX.

Of Bandages.

BANDAGES are strips of linen, muslin, or flannel, used for confining dressings upon wounds and ulcers, and for a variety of surgical purposes.

The proper application of bandages can only be acquired by habit, and the best directions on the subject will be of no use without practice. In the education of a surgeon in Europe, great attention is generally and deservedly paid to instructing him in the dressing of wounds, ulcers, fractures, &c. and I lament that opportunities of acquiring dexterity in this important branch of surgery are so little sought after by medical students in this country.

Bandages are formed in general of muslin. This substance answers better than linen or flannel. It is sufficiently strong to confine dressings, and if necessary, to compress the parts on which it is applied. It is sufficiently flexible to accommodate itself to the shape of every part of the body, and the roughness of its surface prevents it from slipping, properties which are combined in no substance to so great a degree as in muslin—flannel in some cases answers very well, but it retains in general too much heat. The muslin used for bandages is the coarser kind, and it should be washed before it is used. The selvage or stiff margin at the edge of the piece should be torn off before the bandage is made. In general it is best to have bandages free from seams. In case a long roller is wanted, it should be torn from a piece of muslin of the requisite length.

The mode of applying a bandage must depend en-

tirely on the purpose for which it is designed ; where it is intended to confine the plasters on a sore, it should be tight enough to effect this object, without any risk of an interruption to the circulation of the blood. Inflammation and gangrene have often resulted from negligence in this particular.

In the preceding chapters the chief bandages which have been referred to are the roller, and the bandage of strips, the invention of which is ascribed to Scultetus. The simplicity of modern surgery has rejected a vast variety of bandages formerly employed, and with the two just named, the surgeon is enabled to effect most of those purposes for which bandages are necessary. The eighteen-tailed bandage is a modification of that of Scultetus which I think ought never to be employed, because the strips being connected, when one part becomes soiled it is requisite to remove the whole, whereas in case one or more strips be soiled in the bandage of Scultetus it is easy to replace the soiled part. The inconvenience of changing the eighteen-tailed bandage is in some cases very great, as in compound fractures, because to replace it the fractured limb must be completely raised up, whereas if the strips be separate they can be changed without exposing the patient to this painful resource, by pinning the clean strip to the end of each one which is to be removed, and drawing it gently under the limb ;—by attentions like this, a skilful surgeon is often enabled to spare his patient a great deal of suffering, and therefore it ought not to be considered as a subject of trifling importance. The principal instances in which the bandage of strips is proper have been already noticed, but I would now recommend it in all cases in which frequent examinations of the state of a part may be advantageous, and in which the dressings are to be often changed ; it unquestionably in such cases is extremely convenient.

The roller is a long bandage rolled up for its convenient application. The part rolled up is called its head, and surgeons with more ingenuity than science have complicated this simple bandage by rolling it with a double head, and even with four heads. The simple bandage called a single-headed roller may be applied with great ease to any purpose which can be accomplished by these more complicated methods. The circular, spiral, uniting, retaining, and expellent bandages are names applied to the roller in consequence of the manner in which it is applied and of the purposes it is intended to answer.

The art of applying a roller neatly to every part of the body is readily acquired by practice. I shall describe the mode of bandaging a leg, and when the student has sufficiently practiced these directions he will have no difficulty in applying a common roller to every other part of the body.

The application of a roller to the leg is to be commenced by a few turns round the foot. The surgeon is then to carry the head of the roller over the instep, so as to unroll part of the bandage, and apply it just above the heel. It is next to be brought over the inner ankle, thence over the instep, and under the sole of the foot. From this place it is brought again round the foot to the outer part of the leg. After which it is to be carried round the leg by circular turns, ascending gradually in a spiral manner so that each turn of the bandage shall cover about one-third of the turn immediately below it. The shape of the leg renders this business difficult enough to expose the unskilfulness of a surgeon not accustomed to the operation, because when the bandage reaches the calf of the leg it becomes necessary to double back the roller to prevent it from becoming uneven, or ascending too high, so as to leave part of the skin uncovered—a manœuvre requiring some address. Thi

fold or reversing of the roller is to be repeated as often as the shape of the limb may render it necessary, and the roller is gradually carried up to the knee.

The head may be bandaged by means of a roller carried round it in different directions, or by neatly tying a handkerchief about it.

The T bandage which has been more than once referred to, is generally used for covering the trunk of the body and parts in the vicinity of the organs of generation. It consists of two bandages united together at right angles. Mr. John Bell remarks that this is the peculiar bandage of the body. "If the breast or belly be wounded, we make the circular (the part which surrounds the abdomen) very broad, which serves as the proper bandage of the body, and we split the tail part, and passing one leg over each side of the neck we pin it to the circular, so that it forms a suspensary for the main bandage which prevents it from slipping down. But if we have a wound or disease on operation near the groin or private parts, the tail part becomes then the most important part of the bandage; then the circular is smaller and goes round the pelvis while the tail part is made very broad. When the disease is in the private parts, perineum, or anus, we often split the tail according to circumstances, but when the disease is in one groin we generally leave the tail part entire and broad."

For many judicious remarks on bandages, the reader is referred to Bell's Principles of Surgery.

CHAPTER LXX.

Of Opening Dead Bodies.

IN a new country new diseases, and old diseases under new aspects, may be expected to arise. This affords an incentive to the study of morbid anatomy, in addition to the numerous advantages which medical science has already derived from that source.

An instinctive horror of dissecting the dead appears to pervade the whole human family, and in civilized countries this aversion is so great as to afford a powerful obstacle to the improvement of the healing art. Enlightened reason, however, is making a rapid improvement in this respect, and the importance of dissections begins to be acknowledged amongst all ranks of society. In Europe the surgeon is frequently *requested* to examine dead bodies, and in America *permission* to do so is not often denied. It is therefore highly necessary that he should be well acquainted with the methods of conducting his examinations in the most satisfactory manner.

Morbid action it has been remarked by Dr. Baillie, is a very different thing from morbid structure; dissection which detects the latter, throws no light upon the former, and hence the surgeon derives a caution not to hazard an opinion as to changes of structure, before death, unless there be very palpable evidence of the fact. I have examined a body in which there was almost every diagnostic symptom of an organic affection of the heart, and all these symptoms probably arose from dyspepsia, as there was nothing unusual in any of the viscera.

Another introductory remark I beg leave to offer, which is, that to ascertain the effects of disease on the animal

structure, it is essential that its healthy condition be well understood. No person therefore but an anatomist, one who is acquainted with the natural appearances of the various parts of the body, can be competent to such investigations. To illustrate this, it may not be improper to mention one or two very common mistakes to which the unpracticed dissector is liable. He confounds coagula in various places with polypi. A coagulum in the heart or larger vessels is in his view a polypus. He mistakes natural, for diseased productions; the plexus choroides I have known to be magnified into a morbid adhesion; the glands of Pacchioni are sometimes considered as scirrhus indurations, &c. But perhaps a more frequent mistake than any other has arisen from want of attention to the position of the body. The blood never fails to settle and stagnate in depending parts, and hence in general the back of the patient becomes purple and black, resembling those petechiæ which are symptomatic of malignant fever. A young gentleman once supposed he had discovered a symptom of yellow fever which had escaped the notice of all the writers on the subject, a gangrene of the scrotum! His discovery like many other discoveries depended on his ignorance of common appearances. The scrotum being a depending part, is often black from stagnated blood.

The surgeon is occasionally called on by the officers of government to ascertain by dissection the cause of death. In these cases, and in every instance in which his opinion can affect the life of a suspected criminal, too much caution cannot be urged upon him.

Very distressing accidents having sometimes arisen from wounds or punctures of the fingers in dissections, the surgeon should be careful to avoid such injuries.

The instruments necessary in the examination of dead bodies are scalpels, a saw, and strong elevator or chisel,

needles, ligatures, and sponges. Care should be taken to avoid soiling the shroud and coverings of the subject, and the utmost decency should mark the whole operation, every unnecessary exposure being carefully avoided.

It is proper to make the external incision in such situations as not to disfigure the corpse—of course in parts concealed from view.

OF OPENING THE HEAD.

When the head is to be opened for anatomical inspection, it is to be elevated on a block placed behind the neck, and firmly held in that position by an assistant.

An incision should be made through the scalp, from one ear to the other, and the scalp dissected and reverted forward and backward so as to expose the cranium; the temporal muscle is to be divided where it covers the temporal bone in such a manner that it may not interfere with the action of the saw. The cranium is next to be divided with a common amputating saw as nearly as possible in a straight line, beginning just above the frontal sinuses, and continued horizontally around the cranium; the dura mater should be avoided as carefully as possible, but it is scarcely practicable to prevent its being injured in some places.

With the elevator, or what is better a strong chisel, the cranium is to be separated and the external surface of the dura mater examined. This membrane is to be next divided in a line corresponding with that by which the bone had been sawed; at the falciform process it will adhere, but the brain will become exposed by lifting up the lateral portions of the dura mater, and the pia mater can then be examined; the substance of the brain and its ventricles are best exposed by horizontal sections, and if necessary, the falx can afterwards be cut loose, and the whole contents of the cranium inspected.

The blood being removed with a sponge, the brain is to be replaced, the cranium laid over it, the scalp drawn into its natural situation, and by means of an armed needle it is to be there retained by the common glover's suture.

OF OPENING THE THORAX AND ABDOMEN.

When the great cavities are to be examined, an incision is to be made through the integuments from the top of the sternum to the navel, and from thence continued to the anterior superior spinous process of each os ilium, or rather below them.* The integuments and muscles are then to be dissected from the thorax until the cartilages of the ribs are exposed, and these are to be divided near the ribs by a strong knife; the diaphragm is to be separated beneath, the lower part of the sternum is to be elevated, the mediastinum cut from it, and an incision is now to be made across the upper end of the sternum in order to divide the strong ligamentous matter which gives it strength; when this is done it can easily be broken through and turned upwards in such a manner as to expose the contents of the thorax.

If, however, the upper part of the thorax is to be carefully examined, it will be found more convenient to separate the cordiform portion of the sternum from the clavicles, and in this manner to expose the whole cavity of the thorax. In opening the abdomen some caution is necessary in dividing the peritoneum, because when the intestines are distended with flatus they are very apt to be opened unnecessarily by a hasty or careless incision; when the peritoneum is punctured at one place, two fingers should be introduced into the aperture, and the in-

* The crucial incision usually made, occasions more exposure than is necessary and therefore should be laid aside.

cision completed by cutting outward between these two fingers.

The cavities being in this manner laid open, their respective viscera will be subjected to inspection, and this being completed, ligatures are to be tied round any of the viscera or larger vessels which may have been divided, and the parts replaced in their natural situation, are to be kept so by the glover's suture. When it is intended to remove the morbid parts in order to preserve them, great caution is necessary in the dissection, and it is best to take along with the affected parts some portion of the surrounding substance which can be subsequently dissected off with neatness and caution.

In examining the THROAT and FAUCES an incision should be made from the chin to the sternum ; and the pharynx, larynx, tongue, and parts adjacent, are to be brought out and inspected at this incision, after which they are easily replaced, and the skin being neatly closed with the common suture, the body will not be disfigured by the examination.

In the dissection of other parts the best general rule which can be given, is to make incisions sufficiently extensive to answer the end, and to make them as much as possible in places not exposed to view.

I shall conclude this subject by remarking that no anatomical investigation should be commenced until the death of the subject is absolutely certain. The signs of death are foreign from my present subject, but coldness and putrefaction are among those which should be present before any human corpse is subjected to dissection.

THE END.

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